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SOCIAL POLICY DESIGN AND ASSESSMENT: THE CHOICE OF AN EQUIVALENCE SCALE FOR THE ASSESSMENT OF EFFICACY AND EFFICIENCY ON POVERTY REDUCTION BASED ON THE PORTUGUESE SOCIAL INSERTION INCOME

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Abbreviations

EU: European Union (*UE – União Europeia*)

GMI: Guaranteed Minimum Income (*RMG – Rendimento Mínimo Garantido*)

OECD: Organization for Economic Cooperation and Development (*OCDE – Organização para a Cooperação e o Desenvolvimento Económico*)

SII: Social Insertion Income (*RSI – Rendimento Social de Inserção*)

SILC: Statistics on Income and Living Conditions

Abstract

Income redistributive social policies aiming to reduce inequality and poverty have been submitted to more regular and in-depth analysis and assessment within the EU and OECD.

The purpose of this dissertation is to investigate the consequences of assessing income support social policy measures using internationally defined equivalence scales instead of using the nationally defined equivalence scale embedded in each measure.

The dissertation addresses two main questions: 1) what are the effects of assessing redistributive social policies with equivalence scales different from the ones incorporated in the respective policy measures? 2) would the assessment of redistributive social policies improve, in terms of poverty eradication and efficiency indicators, if the equivalence scales used for policy design and implementation and for evaluation are the same?

On a first section of this text the conceptual and methodological framework regarding the assessment of redistributive policies is presented, focusing on the Foster-Greer-Thorbecke indicators and the efficiency model of Beckerman. Afterwards, the main characteristics of EU-SILC data and the rules for accessing the Portuguese Social Insertion Income (SII) are briefly considered. This redistributive program will be used on simulations with different equivalence scales. Thereafter, a theoretical policy measure incorporating the main operating logic of SII and a poverty eradicating goal is envisaged, simulated and discussed. Finally, bearing in mind the initial questions, the results are discussed and indications for future research are considered.

Keywords: Social Policy; Poverty alleviation; Equivalence Scales; Government Policy.

JEL Classification: D63, I32, I38

Resumo

As políticas sociais de redistribuição de rendimento que contribuem para a redução da desigualdade e/ou da pobreza têm vindo a ser objecto de análises e avaliações mais regulares e aprofundadas no quadro das actividades da UE e na OCDE.

O objectivo desta dissertação é o de investigar as consequências de avaliar as medidas de política social de apoio ao rendimento com recurso a escalas de equivalência definidas internacionalmente e que diferem das escalas de equivalência incorporadas nas respectivas medidas desenhadas no plano nacional.

A dissertação procura responder a duas questões: (1) quais os efeitos de avaliar políticas redistributivas com a utilização de escalas de equivalência diferentes das que estão presentes nas próprias medidas de política? (2) a utilização de escalas de equivalência idênticas para o desenho e a avaliação das políticas redistributivas melhora a sua avaliação, em termos de indicadores de pobreza, eficiência e eficácia?

Na primeira parte da dissertação expõem-se os aspectos conceptuais e as opções metodológicas associadas à avaliação de políticas redistributivas, recorrendo aos indicadores Foster-Greer-Thorbecke e ao modelo de eficiência de Beckerman. De seguida, apresentam-se as principais características dos dados do EU-SILC e as regras de atribuição do RSI, que será objecto das simulações com base em diferentes escalas de equivalências. Posteriormente, ensaia-se uma medida teórica que conjugue as regras de funcionamento do RSI com um objectivo de eliminação da pobreza. Finalmente discutem-se os resultados à luz das questões iniciais e as pistas para investigação futura.

Palavras-chave: Políticas redistributivas; Pobreza; Escalas de equivalência; Política Governativa.

Classificação JEL: D68, I32, I38

‘*Different (equivalence) scales may reverse the conclusions drawn about the desirability of policies to redistribute income…*’

Atkinson (1992)

‘*The use of pragmatic scales, especially by prestigious organizations, gives them a life of their own...*’

Coulter (1992)

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Following this perspective, acknowledgements are due to Instituto Nacional de Estatística for providing the raw material for this research: the ICOR micro-data[1] - Portuguese version of EU-SILC.

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[1] Under contract number 282.

Introduction

International organizations, namely the Organization for Economic Cooperation and Development (OECD) and the European Commission (EC), regularly issue reports (Whiteford and Adema, 2007; European Commission, 2008) monitoring the social situation and evaluating the social policies of Member States, in particular on the effectiveness of social transfers on reducing poverty. Naturally, those works rely on a considerable set of methodological assumptions that are necessary, for the very least, to ensure comparability of data and results at various levels. Even the production of common-agreed indicators by the Statistical Office of the European Union (Eurostat) is bounded by these options and by an effectiveness assessment purpose[2]. Nevertheless, relevant national studies concerning the effectiveness of policy measures on reducing poverty follow closely the aforementioned methodological assumptions made by international organizations (Gouveia and Rodrigues, 2002; Rodrigues, 2001, 2004, 2008, 2009).

In this context, the present research investigates one of those assumptions: the equivalence scale, i.e. the way differences in non-income characteristics of households are incorporated in a resource distribution analysis. More generally, equivalence scales are a powerful instrument that allows interpersonal comparisons between individuals incorporating in a common ranking their different non-income needs. We discuss their role on two key moments: firstly, on policy design as the assessment of relative needs due to non-income characteristics of individuals living inside a household has significant effect on the composition of eligible population for means-tested social

[2] See, for instance, http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-NK-03-008/EN/KS-NK-03-008-EN.PDF

transfers (Coulter, 1992); and secondly, on policy efficacy and efficiency evaluation as differences between equivalence scale in policy design and assessment may end-up interfering in the overall performance obtained in the evaluation. One should bear in mind that the social policy-maker consciously (or not) use the equivalence scale as a tool to define the target group of beneficiaries for a given redistributive policy measure. Thus, if the use of a different equivalence scale in evaluating the same policy measure has implications in the results on the overall performance on efficiency and effectiveness, there may be conflict between the policy objectives defined by the decision-maker and those used by the social evaluator in what concerns to the appropriate target group for a specific redistributive program.

The motivations for this research theme can be formulated through two simple questions that illustrate a stream of thought: 1) generally speaking, if your performance is scored according to a set of (externally) defined criteria would you not feel encouraged to adjust your choices in order to fit those criteria more closely? 2) if such an incentive to comply with external assessment would be observed in general politics and in particular on social policy, what would be the repercussions in terms of defining what families are entitled to minimum income schemes and the dimension of resources they would receive?

It is important to state that the OECD does not make recommendations to its Member-States on the adoption of a particular equivalence scale[3] and several of its works and research products use different equivalence scales and sometimes present a discussion on the variability of results if another equivalence scale had been adopted (Whiteford

[3] A brief undated note made by OECD on equivalence scales can be accessed in http://www.oecd.org/dataoecd/61/52/35411111.pdf.

and Adema, 2007; OECD, 2008). Nevertheless, nowadays there is a small portfolio of equivalence scales that are most commonly used on international research on poverty and that are associated with international organizations. Some examples would be the Square Root associated by Luxembourg Income Studies (LIS) and the OECD equivalence scales: either the original OECD original, also known as Oxford equivalence scale and the modified OECD equivalence scale. Two other examples on the importance of this issue are the recent adoption of OECD modified scale in annual reports made by United Kingdom public entities like the Department for Work and Pensions, for reasons of international comparability[4] and the recent use of OECD equivalence scales on the design of Portuguese social policies.

Focusing on the choice of equivalence scales, the present research aims to investigate the existence of impacts on the efficacy in fighting poverty and the efficiency in social spending and try to measure these effects by applying policy simulation to a set of two social measures: the Social Insertion Income (SII) currently existent in Portugal (section 3) and a theoretical new redistributive program aiming to eradicate poverty (section 4). Both measures are means-tested and besides having among their main goals the alleviation of poverty and redistribution of wealth, both programs have efficiency concerns by using benefits as complementary to income until a given level of household monetary resources is achieved.

Based on the dataset of Statistics on Income and Living Conditions (SILC[5]) for Portugal for 2007, the income distribution before social transfers is analyzed and poverty indicators are computed. The simulation of both policy programs is designed and the

[4] Anyaegbu, G. (2010).
[5] See http://europa.eu.int/estatref/info/sdds/en/ilc/ilc_sm.htm for detailed information on this data.

results compared to administrative data, respectively, as well as previous research. The research program will go as follows.

Section one is dedicated to the general conceptual features concerning the present research program, namely the core definition embodied in the investigation field of poverty by the quoted institutions and researchers, the insights of income distribution study and finally the equivalence scales: a short review of its rational, typology and methodological issues is presented and the effects of changing equivalence scales on the analysis of poverty are discussed on the basis of existent literature.

Section two initially addresses data from EU-SILC used in this research, the main characteristics of redistributive program simulated (SII) and the standard analytical tools that will be used to assess results, namely the Foster-Greer-Thorbecke (FGT) indicators in measuring effectiveness on poverty reduction and the Beckerman model for efficiency analysis.

In section three the SII is simulated in four versions. Firstly, a base SII simulation is computed with the actual rules applied in 2007. A second and third version divert from the first solely by the use of original and modified OECD equivalence scales, respectively. A forth version departs from the third due to changes on the benefit reference threshold in order to achieve a global expenditure level similar to simulation one. The four income distributions resulting from the simulations are considered together with the one resulting from initial EU-SILC information on disposable income deducted from SII. This set of results is then used to evaluate how effective the resources channelled by these transfers are in reducing the diverse dimensions of

poverty. Finally the efficiency dimension is also considered, by estimating the proportion of resources that effectively reduce the poverty rate and poverty gap.

In section four, a theoretical new redistributive program aiming to eradicate poverty is simulated in order to enhance the understanding of changing equivalence scales in a context of ’everything else being equal’. The main changes are twofold: setting the household disposable income as the income reference for eligibility and benefit calculation and equalling the benefit reference threshold to the poverty line relevant for each household composition. Two income distributions are computed based on simulations using the SII equivalence scale and the OECD modified equivalence scale. A systematic discussion of the effects on choosing the appropriate equivalence scale for policy design and assessment is then drawn.

The fifth and final section discusses the overall results, short-comes, opened venues for future research and concludes.

1. General conceptual framework

This first section starts by presenting general conceptual assumptions that are considered essential for the discussion of income distribution poverty and redistributive social policies in this research. It then continues with a brief presentation and discussion of a relevant subset of the main common-agreed indicators for monitoring social evolution and policy in the EU usually denominated as "the Laeken indicators"[6]. Finally, based on some potential shortcomings of the Laeken indicators, a set of indicators to measure poverty and social policy transfers efficiency are presented as a global tool box that will be used for this research.

1.1. Conceptual assumptions

For general contextualization it is important to go through the main set of concepts used in standard comparative research on poverty.

In the context of this research "Social Policy" is meant to encompass the ways the welfare is developed in a society, especially in terms of the redistributive role of public agents personified by the State. It comprehends the programs designed to eradicate or reduce social problems (Spicker, 1995:35), like poverty and inequality in disposable income distribution. Therefore, the understanding of Social Policy for the aim of this research follows closely the definition given by Baldock *et al.*: «*A Social Policy is*

[6] The Belgian Presidency Conclusions document can be downloaded at http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressdata/en/ec/68827.pdf. The relevant annex regarding the indicators is the *Report on indicators in the field of poverty and social exclusion* downloadable at http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressdata/en/misc/DOC.68841.pdf.

defined as a deliberate intervention by the state to redistribute resources amongst its citizens so as to achieve a welfare objective» (Baldock *et al.*, 2003:13).

In what concerns this text the main welfare objectives are the eradication and/or reduction of poverty measured through the use of a disposable income distribution.

According to the official definition of poverty within the institutions of the European Union (EU) the members of the population in poverty are «*…those persons, families and groups of persons whose resources (material, cultural and social) are so limited as to exclude them from the minimum acceptable way of life in the Member State to which they belong.*» (EEC, 1985)[7]. This definition implies the use of *relative poverty* and therefore is intrinsically connected to distributive features within a given society and to the individual situation in comparison to a societal chosen referential. In OECD studies it is common to use the 50% of median disposable income as a threshold below which the individuals are poor and the EU generally uses 60% of median disposable income as the "at-risk-of-poverty" threshold, although the common EU agreed indicator on social inclusion typically cover in addition the 40%, 50% and 70% median disposable income.

This research further relies on the perspectives adopted in the reference literature for assessment of social redistributive programs based in the contributions of Weisbrod and Beckerman, on the analysis of efficiency on social transfers (section 2.3.2).

Bearing in mind the goals regarding the reduction of poverty in its several dimensions, the concept of efficiency introduced by Weisbrod (1969) concerns the proportion of

[7] The first official definition was adopted by the European Council in 1975: «*…individuals or families whose resources are so small as to exclude them from a minimum acceptable way of life in the Member State in which they live*». In 1981, the concept of resources used in the former definition was clarified to encompass «*goods, cash income, plus services from other private sources*» (EEC, 1981).

social expenditures geared by the policy program that effectively reduces the poverty indicators in their various dimensions. That conceptual framework was further developed by Beckerman (1979).

In the present research, the reduction on incidence, severity and intensity of poverty are the indicators against which efficacy will be evaluated. The Beckerman analysis complements the efficacy measures in poverty eradication and/or reduction given by the FGT indicators. Indeed, a very efficient social program can have a low effect on poverty reduction or a very effective program in reduction poverty can be either highly or poorly efficient (Rodrigues, 2008).

For the present research, we follow the general approach to assess the effect of social transfers on poverty which is based on a comparison of income distributions before and after social transfers, using a common set of indicators on poverty. Nevertheless, for the purpose of evaluating a particular policy measure it is necessary to simulate an intermediary income distribution that reflects the adequate ordering of resources after all social transfers except the one being studied. We name this intermediary income distribution as 'baseline scenario'[8], as simulations with different parameters will have it as a starting point. The difference of results between this intermediary income distribution and the final income distribution will illuminate the effects due to the referred policy measure.

[8] Or 'base simulation'.

1.1.1. The definition of income and the unit of study

Given the scope of this research, household is the unit of study and its disposable income is used as a *proxy* to the resources indicator required for methodological reasons. In studying well-being, inequality and/or poverty one must define which variables can adequately measure the situation of each individual in those various domains and is common practice to use an one-dimensional variable for reasons of viability either on the availability data as on the compatibility of indicators for the several domains. Although it is fully recognized that neither of those domains are linked to a single set of causes or dimensions and thus cannot be realistically portrayed by a single variable, the use of a comprehensive indicator of resources is acceptable once it is guaranteed that the respective limitations are present during the analysis and specially through the reading and interpretation of results.

The complex task of choosing such a variable can be exemplified in three simple possibilities (Coulter *et al.* 1994): wealth, expenditure and income. In the one hand, it is often argued that wealth can be a more suitable indicator of control over resources and societal status. On the other hand, it is also defendable that expenditure may reflect more accurately the living standard because of its direct link to the use of resources. Nevertheless, the disposable income is the most frequently used variable to represent resources. In fact, this latter possibility is both easier to obtain in more truthfully terms from household budget surveys like EU-SILC (than expenditure and wealth figures) and more representative of spending power (than wealth figures).

In this research disposable income is defined in a very encompassing fashion, since it comprehends income from work as well as transfers and capital revenue, after taxes and

social contributions, i.e. net income. Following the most common practice in EU and OECD studies, income in kind[9] is not considered.

1.1.2. Income receiver unit

Complying with the aforementioned methodology we follow common practice in defining the income receiver unit and use individual information with reference to the household. The underlining aim is to incorporate the complex intra-family distribution of resources in the most standard fashion, i.e. assuming income is shared according to the relative needs of each household member. This homogeneity assumption regarding the analysis of Portuguese social policies can be found in Gouveia and Rodrigues (2002) and Rodrigues (2001, 2004, 2008 and 2009).

The straightforward consequence of the homogeneity assumption is that a person is considered poor if it belongs to a poor household. Accordingly, there can be no households with poor and non-poor members as the resources are distributed exactly by the proportion of each members needs. Thus, if one members share of resources is enough to escape poverty then the other members' share will be, by definition, just enough for that same purpose[10]. What defines the needs and the proportion of resources internally channelled to each member of the household is the subject of next point.

[9] For example: production for domestic consumption imputed rents on houses owned and inhabit by the household, etc. See section 2.1.3. for further information on this issue on the Portuguese context.
[10] See http://www.eclac.org/publicaciones/xml/3/26593/rio_group_compendium-c2.pdf page 36.

1.1.3. Interpersonal comparison of well-being: the role of equivalence scales

When it comes to social policy evaluation, especially on poverty dimensions, the research has a general focus on the individual well-being, usually building-up a social welfare assessment by the use of a social welfare function that aggregates the individual welfare into the collective level. Two considerations are worth mentioning when addressing this global distribution of individual welfare.

On the one hand, there is overspread recognition that a certain amount of money gives different access to goods and services (i.e. power over resources) for an individual living alone than for four individuals living within a household of two adults and two children. Therefore the needs and the resources necessary to guarantee a certain level of well-being increase with the household dimension.

On the other hand, an individual living alone may buy one daily newspaper but a family of four individuals does not need to buy four newspapers. Similarly, the household does not need to spend four times more housing space, electricity, gas, water, etc. This phenomenon is generally described as economies of scales and illustrates the importance of incorporating non-income characteristics in the analysis of individual and social well-being, inequality and poverty. Needs may grow with household dimension, but the existence of economies of scales does not make this relation straightforward.

The standard practice is to account for the dimension of the household, i.e. the number of members living together and sharing resources and also the age of each member, as it is usually accepted that the needs of an adult are superior to the needs of childhood and adolescence, namely due to professional costs.

In order to have these effects in consideration, the application of an equivalence scale is an useful standard mechanism that allows for an adjustment of the global household income, transforming it into a comparable indicator of resources: the adult-equivalent income[11].

1.1.4. Demographic units weight

The adjustment of income ranking by accounting the non-income characteristics of individuals raises the question on how to account for the demographic unit, i.e. should the household, the individual or an adult equivalent be considered?

Once more the common practice is to refer to the equivalent income of individuals. Cowell (1984) argues that social well-being is dependent of individual well-being regardless of the choice of units in which they are considered or from the type of household they form.

1.2. Indicators for comparative social policy assessment – the European framework

The social policy sphere is of growing importance for the European integration and the European Union legitimacy. Being a transnational body created to promote market integration and submitted to a very strong subsidiary principle, the EU built a positive mechanism of European integration based on exchange of information, good practices and agenda setting initiatives on the issues where its mandate is not so strong. The Open-Method of Coordination (OMC) was then designed to develop and enhance the area of European influence and capability of assessment on national policy making.

[11] Section 1.3 develops the formal treatment and detailed assumptions associated with the use of equivalence scales.

In 2001, the Laeken European Council approved a set of 18 statistical indicators to comparatively monitor the Member States' progress in regard to the agreed EU objectives on the domain of Social Inclusion. This decision was drawn in the follow-up of the Lisbon and Nice European Councils where the Member States' Governments determined that the fight against poverty and social exclusion would be developed within the framework of the OMC. A natural implication of this option was the need to define commonly-agreed objectives for the European Union and the development of national action plans to fulfil these objectives, with the standard periodic reporting and monitoring of progress, procedures that characterizes the OMC. The 18 common statistical indicators were therefore designed to measure in a comparable way the progress towards the agreed EU objectives and comprise four key areas: financial poverty, employment, health and education. While these four areas draw from the multidimensionality of the social exclusion phenomena, our research will focus on some of the 8 indicators associated with poverty measured by monetary components.

Table 1. Laeken indicators for financial poverty – Designation and description

	Indicator designation	Indicator description
1	**At-risk-of –poverty rate**	Share of population with an equivalised disposable income below 60% of the national equivalised median income. Equivalised median income is defined as the household's total disposable income divided by its "equivalent size", to take account of the size and composition of the household, and is attributed to each household member.
2	**Relative at-risk-of-poverty gap**	Difference between the median equivalised income of persons below the at-risk-of poverty threshold and the threshold itself, expressed as a percentage of the at-risk-of poverty threshold.
3	**Dispersion around the at-risk-of-poverty threshold**	Share of population with an equivalised disposable income below 40%, 50% and 70% of the national equivalised median income.
4	**At-risk-of-poverty rate before social transfers: two versions – excluding pensions or including pensions**	Relative at-risk-of-poverty rate where equivalised income is calculated as follows: excluding all social cash transfers (version 1) or including retirement and survivors pensions and excluding all other social cash transfers (version 2). The same at-risk-of-poverty threshold is used for these statistics and indicator 1, and is set at 60% of the national median equivalised disposable income (after social cash transfers).
5	**At-persistent-risk-of poverty rate**	Share of population with an equivalised disposable income below the at-risk-of-poverty threshold in the current year and in at least two of the preceding three years.
6	**At-risk-of-poverty rate anchored at a moment in time**	In year t, share of population with an equivalised disposable income below the at-risk-of-poverty threshold in year t-3, uprated by inflation over the three years.
7	**Inequality of income distribution – S80/S20**	Ratio of total income received by the 20% of the country's population with the highest income (top quintile) to that received by the 20% of the country's population with the lowest income (lowest quintile). Income must be understood as equivalised disposable income
8	**Inequality of income distribution - Gini Coefficient**	Summary measure of the cumulative share of equivalised income accounted for by the cumulative percentages of the number of individuals. Its value ranges from 0% (complete equality) to 100% (complete inequality).

Source: Eurostat, 2003

The "at-risk-of-poverty-rate" indicator is probably the most used indicator in poverty analysis. It indicates the percentage of individuals on the population with such a low level of resources that can prevent them from living in «*…the minimum acceptable way of life in the Member State to which they belong.*» (EEC, 1985). This is a relative concept of poverty because of its relation to standards existent in the society as opposed

to an absolute concept that would refer to the minimum individual basic needs regardless of the societal norm.

The Laeken indicators further disaggregates this indicator by age and gender, most frequent activity, household type, tenure status and illustrative values of two thresholds (one person household and a couple with two children household).

It is worthwhile to note the role of equivalised income in building up of the at-risk-of-poverty rate. The decision of the Laeken European Council in December 2001 was to use the modified OECD equivalence scale for this purpose. Consequently the relative situation of households and implicitly the relative needs of each type of member inside of the household were thereby defined. Therefore this decision has clear influence in redistributive policy assessment and therefore is not neutral[12] (Coulter *et al.* 1994).

The "relative at-risk-of-poverty gap" measures the difference between the median equivalised net income of the population living at-risk-of-poverty and the at-risk-of-poverty threshold. This difference is expressed as a percentage of the at-risk-of-poverty threshold and reflects the distance between a central statistical measure of resources of the at-risk-of-poverty population and the resources needed to eradicate such poverty.

Beside the aforementioned considerations on the equivalence scale, it is worthwhile to reflect on the consequences of choosing the median equivalised net income in spite of the mean equivalised net income to compare with the at-risk-of-poverty threshold. This indicator gives information about the lack of resources in the population with less equivalised net income than the relevant threshold. Therefore, it focuses specifically on

[12] In Annex I a simple example of a figurative society and respective income distribution illustrates the variability of this indicator to the choice of the equivalence scale.

a population sub-group with fewer resources (including none) hence complementing the identification and relative quantification information given by the at-risk-of-poverty rate. Accordingly, the use of information provided by the median restricts strongly the capability of illustrating the whole scope of changes taking place on this population sub-group, as it locks only on changes for the central observations. Instead, the use of information provided by the mean would be more sensible to changes in the whole distribution of this population sub-group and would reflect, for instance, the modifications that occur in the poorest of the poor, in the very bottom of income distribution without having the problem of extreme high values, as it happens when considering the whole income distribution. An example of the loss of informative power could be illustrated by a specific program that would guarantee a substantial raise in the resources of the 45% of population with less equivalised net income without changing the median income of this sub-group. After such a program, on the one hand, the amount of resources that would be necessary to further channel to at-risk-of-poverty population in order to eradicate poverty would be less than in the original situation and on the other hand, both the intensity and the severity of poverty, measured by Foster-Greer-Thorbecke indexes ($\alpha = 1$ and $\alpha = 2$, respectively) would be inferior. In section 3 we explore the possibility of such a misinformation effect happen with SII, as Rodrigues (2001) demonstrated the main achievements of this program to be exactly on reducing the intensity and severity dimensions of poverty.

The set of indicators designated by “dispersion around the at-risk-of-poverty-threshold” follows the same methodology as the at-risk-of-poverty rate (indicator 1), with the exception of the threshold, which is calculated for 40%, 50% and 70% of median equivalised net income. Assuming that the choice of the threshold is not consensual, this

set of indicators can help analysts to have an extra sensibility to the variance on the prevalence of risk-of-poverty due to a change on the level of indexation of the threshold to median equivalised income. This approach follows a widely accepted recommendation among the scientific community regarding the subjectivity and social value embedded in the choice of a vast set of methodological options, within which equivalence scales are included, that states the need to have sensibility tests to the chosen parameters in order to have a perception on the degree of influence of those parameters on the results obtained. The research conducted in this text fully agrees and follows that recommendation, as its main purpose is to have such a perception concerning the choice of equivalence scales on monitoring a particular redistributive social policy.

Both versions of the "at-risk-of-poverty rate before social transfers" indicator are built with the goal of allowing a comparison with the standard at-risk-of-poverty rate, which includes social transfers and therefore permit an overarching evaluation of the effect of social transfers in reducing the incidence of poverty.

Although Eurostat states that this indicator *«On its own does not have any explanatory value.»* (Eurostat, 2003:29) one can argue that inequality resulting specifically from the function of market agents sets the background upon which social transfers operate and confines its impacts. However, Eurostat also refers that the calculation of this indicator (in both versions) uses the at-risk-of-poverty threshold calculated in indicator 1, based on equivalised net income distribution after social transfers.

The "at-persistent-risk-of-poverty rate" indicator introduces the longitudinal dimension in poverty analysis, defining persistency as belonging to the at-risk-of-poverty

population sub-group for, at least, two years in the preceding three years. This indicator is measured only in the households that stayed in sample group for four year.

The “at-risk-of-poverty rate anchored at a moment in time” indicator aims at setting the reference point at a given year in the past, by defining the at-risk-of-poverty threshold in the standard way in that specific year. This threshold is then updated to incorporate inflation between the reference year and the year being analyzed and it is used to compute the population at-risk-of-poverty is this latter year. The main purpose is to give information about the evolution of the phenomena by recalling the standard for measuring the prevalence of poverty used in specific point in the past and evaluating the situation afterwards with that standard in mind.

As poverty analysis is often considered to be a partial analysis of income distribution that focuses on the segment of the population with lesser resources, inequality throughout the entire income distribution is also relevant for social cohesion and justice.

The quintile share ratio S80/S20 aim to measure the total income received by the 20% of a country’s population with the highest equivalised total net income divided by the 20% of the country’s population with the lowest equivalised total net income. This measure enables the analyst to have a perception about the amplitude in income differences between two very significant population groups.

Nevertheless, methodological options defined the use of mean equivalised net income of each population share, the bottom and top quintile, as to «… *minimize any impact from the fact the numbers of persons in the quintiles may vary from the anticipated 20% of the total population during the quintile-distribution process*» (Eurostat 2003:7). In addressing this option one may consider the risks of choosing a statistical instrument so

sensible to extreme values, i.e. the mean, particularly when including data from the top quintile where typically this kind of values do occur.

The income distribution used to assess inequality is the equivalised net income and the notes referred in the previous point regarding the at-risk-of-poverty rate also make sense here. The quintile household composition may be quite influenced by the economies of scales incorporated in the equivalence scale and reflected a judgment on the relative needs inside a household and therefore between different household types.

The Gini Coefficient returns the relationship of cumulative shares of population ordered by level of income and cumulative share of equivalised net income received by that population. Compared with the quintile share ratio (indicator 7) the Gini Coefficient uses data from all equivalised net income distribution, while the S80/S20 analyzes two shares of population located on opposite sides of equivalised net income distribution. The two indicators are complementary in inequality analysis.

As this research focus on poverty analysis both indicators on inequality will not be considered. Additionally, as simulations are based on a single year (2007), indicators with a longitudinal component will also be disregarded. Finally, the indicator based on at-risk-of-poverty before pensions and/or social transfers is of no use on the approach here developed for the investigation of a single policy measure. Therefore, from the Laeken indicators for financial poverty set only the first three indicators will be used on the empirical sections.

1.3. Equivalence scales: rational and typology

This section starts by developing briefly the rational, methodology and empirical application of equivalence scales. In this context, two important questions are introduced by Coulter *et al.* (1992):

1. *Is there a "correct" equivalence scale?*

2. *«Do the conclusions of distributional assessments depend on which particular scale one uses?»*

As seen on section 1.1.3 equivalence scales are relevant for interpersonal comparisons of well-being. As people live in households and share resources, their needs differ according to a set of features characterizing that household. Some of these non-income features are usually taken in consideration when building-up a distribution that is significant for inequality, poverty and well-being analysis.

1.3.1. Rational on equivalence scales

In the complex analysis of well-being, inequality, poverty and income distribution great attention has been directed to the property of summary measures, namely the set of indicators on poverty presented on section 1.2. No doubt that the normative judgments inherent to each of these measures must be present in the researchers mind when conclusions are drawn as no measure is absolutely neutral or objective in terms of values. Nevertheless, it is important to pay due attention to the fact that this tool set ought to be applied on income distributions that are assumed to be well-defined, as measured income must be complemented by the need to take in consideration the non-income differences between income-receiving units. A very empirical approach has

been to assume that summary measures developed with reference to unadjusted distributions may still be used for distributions that incorporate non-income information. Therefore, standard practice is to adjust measured incomes by a factor depending on needs so as to obtain the "equivalent income" distribution which, by construction, is comparable across income units (Coulter *et al.*, 1992:78).

1.3.2. Typology and methodology issues

This section exposes very briefly the main equivalence scales used on social policy research, the respective methodology of construction and some of the more discussed strengths and weaknesses. Coulter *et al.* (1992) identified five main types of equivalence scale presented on the following table.

Table 2. Equivalence scales and main source of information

Type of equivalence scale	Main source of information
Econometric	Based on what people buy – spending surveys
Subjective	Based on what people say – questionnaires
Budget standard	Based on experts judgment – goods and services prices
Social assistance	Based on social policy benefits – policy decision
Pragmatic scales	Based on prestigious organizations – "prescription"

Source: Based on Coulter *et al.* (1992)

For a long-time substantial importance was attributed to "econometric equivalence scales" which benefited greatly from the development of econometric derivations and models on household behaviour built on the also growingly available information provided by income, expenditure and living conditions surveys. The most attractive feature of this approach relies on the economic model that underlines the econometric method to estimate equivalence scales. This model «…*links household choices, well-*

being and composition in a systematic way…» (Coulter, 1992:89) apparently leaving no space for "value judgments".

This approach assumes household maximization of utility subject to the total expenditure constraints and Marshallian demand functions to each good or service. Using indirect utility functions, demands can be interpreted as choices which minimize the expenditure required to achieve a certain utility level and so preferences can be represented by a consumer cost function. In this context, the equivalence scale is defined in a similar way as a price index inherent to each household characteristics in comparison to a reference household, typically 1 adult living alone.

One of the main choices in this procedure concerns the assumptions on how non-income characteristics affect demands and to which extent their impact is similar to a price change. Several models have been applied, namely: Engel (1985), Rothbarth (1943), Prais and Houthakker (1955), Barten (1964), Pollar and Wales (1981), among others (see Coulter, 1992:87; Muellbauer, 1977; Lewbel 1985).

Two relevant issues regarding econometric approach are the identification problem (Pollar and Wales 1979) as «…*many different equivalence scales may be recovered from the same expenditure data set*...» (Coulter, 1992:90) and some conceptual drawbacks regarding the economic model underlying the econometric approach in what concerns to its limitation as a static model that does not take in consideration "leisure" and home production.

In what concerns "subjective equivalence scales", the computation is based in direct questions to individuals as to what levels of income correspond to determined standards of living. Their answers are then linked to their household composition and the

equivalence scales are computed. An example of this approach can be found in Kapteyn and Van Praag (1976) and an illustrative discussion on the method was made by Hartog (1988).

On the strengths and weaknesses of this method one can start by drawing on the similarities and differences of the subjective approach compared to the econometric approach (Van Praag and Van der Sar, 1988). Firstly, both are based on behaviour: one in verbal/written statement, the other on choice/expenditure. Secondly, both have a strong "common assumption": the subjective approach assumes common response behaviour across individuals and the econometric approach assumes common demand behaviour. Thirdly, there is a different direction regarding welfare information: the subjective approach assumes that verbal labels describe welfare levels and econometric approach assumes that demand captures the unobservable welfare concept. Another relevant issue, labelled as "preference drift", was raised by Kapteyn and Van Praag (1976), as empirical work found that evaluations change in a systematic way with respondents' current income. Additionally, there is a concern about the clear and common understanding and interpretation of the income evaluation question by respondents.

In the "budget standard equivalence scale" approach, the standards of living are determined by a chosen set of goods and services, respective prices and resulting budgets. The choices derived from experts' judgments on what goods and services, in what quantities and at what prices, should incorporate the budget set. An empirical example of this method was developed by Orshansky (1965).

The experts' role in this approach is simultaneously its most evident weakness and strength. Compared to expenditure based-only approaches as the econometric one, the lack of objectivity of the expert is one clear critique (McClements, 1978; Nicholson, 1976). Nevertheless, options are made clear and explicit and behaviour information is usually taken in consideration by experts, namely through the use of household expenditure data.

Besides the issue of conceptual coherence on a method that is built-up on a mixture of methods, the budget standard approach is most used with reference to a subsistence or poverty standard of living, being limited in terms of general application on analysis of the whole distribution, as required by inequality studies. Additionally, this method is highly dependent on the reference prices levels.

The "social assistance equivalence scales" are associated to means tested income benefits provided by most social protection systems. It is usual for this kind of benefits or redistributive programs to take the household's composition in consideration not only when determining the reference income of the applicant which will be compared to the means test threshold for eligibility, but also for calculating the benefit amount. Therefore, for each redistributive program the differences in amounts paid to households that are exclusively due to differences in household composition can be interpreted as the social policy equivalence scale for that specific redistributive program.

Most often these equivalence scales represent the views of elected governments or their staff and it is not unusual to see different equivalence scales in different program implemented by the same executive or the coexistence of long implemented programs

with their original equivalence scale with news redistributive programs which incorporate new equivalence scales. Consequently it is quite difficult, if not impossible, to claim a "democratic consensual based" equivalence scale for social assistance scales. Additionally, means tested redistributive programs are quite often «*...benefits aim to provide "safety net" minimum incomes...*» (Coulter, 1992:100) and therefore their relativities may not be appropriate to evaluate the whole income distribution. Naturally, the SII equivalence scale falls on this category.

The "pragmatic equivalence scales" are in the core of the present research given its wide utilization on international literature. In fact, as Coulter states «*The use of pragmatic scales, especially by prestigious organizations, gives them a life of their own, which is then sustained because subsequent researchers often fell they should use one of the scales to maintain comparability*.» (Coulter, 1992:101). The author goes on stating that the pragmatic scales «*...are probably the type most commonly used for empirical assessments of income distributions*» (Coulter, 1992:101).

While a wide range of equivalence scales exists[13], some of the most commonly used scales are included in the following table, together with the SII equivalence scale and the *per capita* scale, included just for reference.

[13] For further developments, consult Atkinson *et al.* (1995).

Table 3. Household size and pragmatic equivalence scales

Household size	Equivalence scale				
	Per capita income	"Oxford" scale	"OECD-modified" scale	Square root	Social Insertion Income
1 Adult	1.0	1.0	1.0	1.0	1.0
2 Adults	2.0	1.7	1.5	1.4	2.0
3 Adults	3.0	2.4	2.0	1.7	2.7
1 Adults. 1 child	2.0	1.5	1.3	1.4	1.5
1 Adults. 2 children	3.0	2.0	1.6	1.7	2.0
1 Adults. 3 children	4.0	2.5	1.9	2.0	2.6
2 Adults. 1 child	3.0	2.2	1.8	1.7	2.5
2 Adults. 2 children	4.0	2.7	2.1	2.0	3.0
2 Adults. 3 children	5.0	3.2	2.4	2.2	3.6
Elasticity	***1.00***	***0.78***	***0.61***	***0.50***	***0.85***

Source: Based on Förster (1994); Instituto Nacional de Estatística – Portugal. elasticities estimated from ICOR 2008 micro-data.

The simplicity, the absence of any cost to produce and the great applicability to most income datasets are some of the clear advantages of this type of scales. Nevertheless, they incorporate choices and those choices have a translation in terms of normative judgements as they bring implications for conclusions on distributional assessments.

Table 3 presents figures for the elasticity of equivalence scale estimated for the Portuguese population in 2007[14]. Aside from the *per-capita* income, the Social Insertion Income equivalence scale appears to be the most generous scale (0.85), followed closely by the Oxford equivalence scale (0.78) and, at a considerably distance, the OECD modified equivalence scale (0.61) and the square root (0.5). On the empirical sections the simulations with these three scales may illustrate the impact of these different distances.

[14] See the next section for the formal approach to this parameter.

1.3.3. Effects of changing Equivalence Scales on the analysis of poverty

Picking up on the second key question identified on section 1.3, it is important to evaluate whether the conclusions on the analysis of distributional assessments depend on the particular scale used. This section draws on Coulter *et al.* (1994) investigations on the effects on poverty and inequality measures of changing the equivalence scales.

Following Buhmann *et al.* (1988), the authors based their analysis on a simple formulation of the equivalence scale depending exclusively on the household dimension. Therefore the scale *M* of the household *i* is a function of the household size S_i and the economy of scale factor θ.

$$M_i = S_i^{\theta} \tag{1.1}$$

Consequently, taking X_i to represent the total disposable income of household *i*, the equivalent income is then defined by:

$$Y_i = \frac{X_i}{S_i^{\theta}} \tag{1.2}$$

As θ varies between 0 and 1, when $\theta = 0$ there is no adjustment for needs and when $\theta = 1$ the equivalent income equals the *per capita* income for a specific household. Accordingly, higher values of θ correspond to smaller economies of scale inside the household and higher equivalent income for each household member. Despite the fact that many equivalence scales take a different formulation from the mathematical power function defined above, Buhmann *et al.* (1988) point out that «*While some scales also involve variations in need by age of family members and by family structure (one*

parent, two parent), when converted to simple scales by family size, or so much per adult and per child, the scale values fit the power relation very closely.» (Buhmann *et al.*, 1988:119).

In what concerns the impact on the assessment of poverty of varying θ, Coulter *et al.* (1994) concluded that all members of the Foster, Greer and Thorbecke[15] (1984) class of poverty indexes present a behaviour that can be decomposed in three effects:

1. a "pure poverty line" effect, as poverty increases with rising θ;

2. a "distribution shape" effect, as the "pure poverty line" effect will be bigger the more densely populated is the income distribution around the poverty threshold;

3. a "indirect poverty line" effect, as the poverty threshold is defined by a percentage of the median income and this latter diminishes with an increasing θ.

The first two effects work in the same direction and are countered by the third. On the empirical analysis, Coulter *et al.* (1994) found that this result gives the relative poverty indicators a U-shape property. On two dimensions, inequality and poverty, the authors conclude that the «*…results are sensible to scale choice...*»

[15] The Foster, Greer and Thorbecke class of poverty indexes will be addressed on section 2.3.1.

2. Data, simulation and analytical methodology

This section presents the main characteristics of the data used in this research, the legal framework regarding the SII redistributive program and develops a brief description on the simulation and analytical methodology followed. This analytical framework follows closely Rodrigues (2001, 2004 and 2009) analysis on the Guaranteed Minimum Income (GMI[16]), presently embodied in the SII. Before entering the empirical section of this research, a theoretical discussion according to Beckerman efficiency framework is envisaged both on SII and on an alternative theoretical poverty eradicating program.

2.1. Data: Statistics on Income and Living Conditions (SILC)

Due to the growing European integration and particularly to the Open-Method of Coordination on the field of Labour, Employment and Social Affairs, there is presently a collective effort to gather data and produce information in a common standardized way, in order to ensure international comparability. The OECD and other International Organizations that analyze and advise on several national and transnational issues have also contributed strongly to the normalization of information and statistical procedures.

The data used hereby was collected by the National Statistics Institute (INE) in a common process coordinated by the Statistical Office of the European Union – Eurostat – under the Statistics on Income and Living Conditions (EU-SILC) designation.

2.1.1. Aim and main features of EU-SILC

The EU-SILC is an European level coordinated data collection process and producer of common-agreed indicators, very important for the implementation of the European

[16] The SII was implemented as a reformulation of the GMI made on 2003.

Union' Social Agenda and Social Inclusion Strategy, operating mainly through the Open Method of Coordination.

The EU-SILC concerning Portugal results from the application by the Portuguese National Statistic Institute of the inquiry "*Inquérito às Condições de Vida e Rendimento*" (ICOR – Inquiry on living conditions and income) to the citizens living in Portugal. The purpose of this inquiry is the «*…production of statistics on income distribution, living conditions and social exclusion with a focus on comparability between the EU Member-States and also on the transversal and longitudinal survey on income and social exclusion*» (INE, 2006:6).

This annual inquiry started in 2004, replacing the former European Community Household Panel, allowing the analysis of the composition and distribution of household and individual income, living conditions, the effect of social transfers on poverty and social exclusion and the association between poverty and social exclusion, on the one hand, and economic activity, employment, social and family typology, education, health and housing on the other hand (INE, 2006:7).

The national inquiry is based on a reference questionnaire designed by the Eurostat, although adapted at a national level and incorporates information concerning the individuals living in non-collective residences. Therefore individuals living in institutions, people without shelter and nomads are not considered with the possible bias on income distribution and inequality and poverty measures due to the higher probability of low income in those population sub-groups. The latest Census estimates that this group represents less than 1% of the population.

Another important feature is the inquiry focus on domestic private households which is based on a general assumption of equal intra-familiar distribution that can underestimate the true inequality according to Woolley and Marshall (1994)[17].

2.1.2. Sampling options

The sampling technique used on the inquiry is based on a main-sample on housing built on the latest Census (2001). Thus the sample unit is the household main residence and the study units are the Private Domestic Household and the Individual.

According to the Regulation (CE) no. 1.177/2003 (16th June), the sample dimension was computed at national level in order to ensure adequacy to cross-sectional and longitudinal components. The sample technique returned a dimension of 6.504 household main residences with an annual turnover of ¼ of the sample. This latter feature implies that during the first four years ¼ of the households will remain in the sample for only one year, ¼ will stay for two years and another ¼ will participate in the inquiry for 3 years. Thereafter, the fulfilling of turnover goals will imply a minimum participation of 4 years for each household selected by the sample technique.

2.1.3. Information on income

The main resource variable used throughout this text is the disposable income defined as «*Mean gross income less income tax, regular taxes on wealth, employees', self-employed and unemployed (if applicable) compulsory social insurance contributions, employers' social insurance contributions and inter-household transfer paid*» (Eurostat, 2008:51).

[17] See section 1.1.3. for comments on poverty consequences of this assumption.

One important issue concerns the exclusion of non-monetary components of household income on the calculation of disposable income. One the one hand, this type of income has a significant importance in Portugal, representing well above 10% of total income[18]. One the other hand, in general, means tested redistributive policies in Portugal do not take in consideration the existence of this kind of resources, possibly due to the difficulty in obtaining good information on this issue. Naturally, accounting for this type of resources on the process of evaluating redistributive policies like SII could reveal some lack of focus of eligibility conditions in both policy measures[19].

2.2. The Social Insertion Income

Every since there is availability of data for international comparison, Portugal has exhibited a substantial differential on the incidence of poverty when compared to the average of its European partners (Wolff, 2010). The access to the European Union in 1986 and the emergence of more data and studies on this reality started to give a broader perception on the extension and severity of the phenomena and in 1992 the European Council issued the Recommendation 92/441/EEC of 24 June 1992 "*On common criteria concerning sufficient resources and social assistance in social protection systems*»[20]. Only in 1996 Portugal started to fulfil the aim of the recommendation developing the experimental implementation of the Guaranteed Minimum Income[21].

[18] Rodrigues, C. F. (2008) estimates non-monetary income components to represent between 18% (1995) and 14% (2000) of total household income. INE (2008) presents an estimation on non-monetary income for 2005/2006 of 19% based on expenditure data.
[19] It seems relevant to simulate both policy measures by reference to the monetary income components considered in eligibility conditions.
[20] Published in the Official Journal L 245 of 26.8.1992
[21] This policy program would be replaced in 2003 by the Social Insertion Income, but the main features remain the same.

2.2.1. Aim and main features

The main target of the Guaranteed Minimum Income (GMI), designed and initially implemented in 1996, was to provide support to individuals legally resident in Portugal and respective families in situations of great economic need, through a social insertion program including vocational training and active job search and also a monetary benefit to alleviate the severe economic situation and promote conditions for the insertion program to be well implemented. The Social Insertion Income implemented in 2003 follows the same propose and replicates almost entirely the approach previously implemented, but puts a bigger emphasis on the activation efforts which was accompanied by a strengthen of the audit actions in order to prevent misuse of this program.

Therefore eligibility is granted to all legal residents that fulfil the following conditions:

- Individuals living alone whose income is inferior to 100% of the social pension[22];
- Households whose total income is inferior to the sum of the following amounts:
    a) 100% of the social pension amount for each of the first two adults;
    b) 70% of the social pension amount for each adult beyond the second;
    c) 50% of the social pension for each of the first two minor children;
    d) 60% of the social pension for each minor child beyond the second;

[22] In 2007, the social pension amount was € 177.05.

e) If the entitled individual, his spouse or a person living in a *de facto* union is pregnant, the amount referred in a) is increased by 30% during the pregnancy period and by 50% during the child's first year.

Household income results from the sum of all income sources (gross income) obtained in the month previous to the request of the benefit, with the exception of income provided by housing subsidy, family benefits and scholarships. Additionally, only 80 % of labour income after deduction of social contribution is considered. During the Social Insertion Program, only 50% of income obtained from a new job or from vocational training grants is considered to the household income for the first 12 months.

The monetary benefit attributed by the SII program aims to eliminate the gap between the household income and a specific threshold with reference to the amount of the social pension.

The SII benefit amount equals the difference between the individual/household income and the threshold amount indexed to the social pension resulting from the eligibility criteria mentioned above[23].

2.2.2. Simulation methodology

The simulations of the redistributive effects of SII will begin with the construction of a baseline scenario, upon which will be applied the eligibility conditions for each policy measure, resulting in the identification of households that will receive the benefits and the respective benefit amount. Naturally the data availability on information used to

[23] In the simulations developed in section 3 additional top-up SII benefit amounts due to special conditions like pregnancy, disability, dependency, housing support, etc. were not considered. This can underestimate values of average benefits and therefore the global SII expenditure.

verify the eligibility conditions and the modelling options regarding the incomplete/missing data will also be of a great importance.

The comparison between two income distributions, one previous to the policy redistributive effect and one resulting from that redistributive effect, is the key point for the assessment. Poverty measures applied to both distributions will clarify the effects of that social transfer as well as Beckerman's tools for analysis of the vertical efficiency of a program (VEP) and the poverty reduction efficiency (PRE). Laeken indicators for financial poverty will also be computed.

A first step to setup the baseline scenario implies the aforementioned treatment of income data in order to obtain the resources variable considered in each measure for the mean test. For the SII all monetary components of income are considered, although only 80% of salaries and wages is accounted for and rent subsidies, family benefits and student grants are disregarded.

In a second step it is necessary to identify the equivalence scale used in SII. Crosschecking this identification with the reference value used[24] it is possible to calculate the eligibility threshold for each family type.

The following step is the identification of eligible households by comparing relevant income obtained in the first step with the thresholds referred in the second step. Whenever the former is inferior to the latter, the household is considered to be entitled to the benefit. In SII the benefit amount equals the difference between reference income and the threshold respective to its family composition.

[24] The social pension for the Social Insertion Income.

The final step is to compute the two new income distributions by adding the benefit amount to each eligible household income and building up the “after-SII” distributions. One of the questions addressed in this research is if the building up of income distributions, both the baseline and “after-SII”, should be made with the equivalence scale of the measure under study.

When evaluating all social transfers it may be quite a difficult task to obtain a synthesis equivalence scale that reflects the interpersonal needs implied by several social policy programs possibly designed by several politicians in different point in time and with different aims and assessments of social policy. Nevertheless, when assessing one particular redistributive program it might be of interest to acknowledge the policy options embedded in the political evaluation underlining the redistributive program. After all, the policy designer did introduce a specific interpretation of interpersonal needs and economies of scale inside the household and thus ordering the household by that particular criterion in terms of eligibility to the social program conceived. When evaluating that redistributive policy we argue that it may be important to have a perception on the effects of following the standard procedure of choosing an international reference scale or choosing to comply with the social and political assessment that drove the decision-maker. Nevertheless, on section 3 and 4 we follow standard procedures on building the income distribution by using the modified OECD scale. However, annex III presents the empirical data for a theoretical Poverty Eradicating Benefit (PEB) using the SII equivalence scale both on the income

distribution and on one of the two simulations[25], although results are considered but not discussed.

The simulations are based on an essential assumption: there is no behavioural change in households and/or individuals in what concerns their participation in SII.

2.3. Analytical tools

Not losing grasp on the importance of the "Laeken indicators" and bearing in mind some of its shortcomings discussed on the sub-chapter 1.2, it is considered appropriate to take stock of the major developments of economic analysis on income distributions, poverty and welfare which are well documented in Atkinson and Bourguignon (1999). This section gives a brief formal presentation on the main analytical tools used: the Foster-Greer-Thorbecke indicators and Beckerman's model on efficiency analysis.

2.3.1. Measuring poverty: Foster-Greer-Thorbecke indicators

In what concerns poverty the main indicators used will be the Foster-Greer-Thorbecke indicators. For a detailed discussion on FGT measures, see, for example, Rodrigues (2008).

To identify the incidence of poverty standard studies on poverty and income distribution usually rely on a poverty line (or poverty threshold), defining the level of resources below which an individual is considered poor or, according to the European Commission designation, "at-risk-of-poverty". Defining z as the poverty line, the poverty rate is given by:

[25] The other simulation uses the modified equivalence scale.

$$\int_0^z f(y)\,dy \tag{2.1}$$

The poverty gap indicating the mean deficit in resources of the poor population in reference to the poverty line is given by:

$$\int_0^z \left[\frac{y-z}{z}\right] f(y)\,dy \tag{2.2}$$

The Foster-Greek-Thorbecke Indexes (FGT) assumes the following form:

$$F(z;\alpha) = \int_0^z (z-y)^{\alpha}\ f(y)\,dy \tag{2.3}$$

One special feature of these indexes is that when α = 0, the FGT returns the poverty rate value, when α = 1, FGT gives the poverty gap value and when α = 2, the FGT returns a new indicator on inequality between the poor population designed by "severity of poverty".

Frequently in the literature the presentation of FGT indexes is in a normalized fashion, in order to ensure its invariance to the monetary units:

$$\overline{F}(z;\alpha) = \int_0^z \left(\frac{z-y}{z}\right)^{\alpha}\ f(y)\,dy \tag{2.4}$$

2.3.2. Beckerman model for analysis of efficiency on social transfers

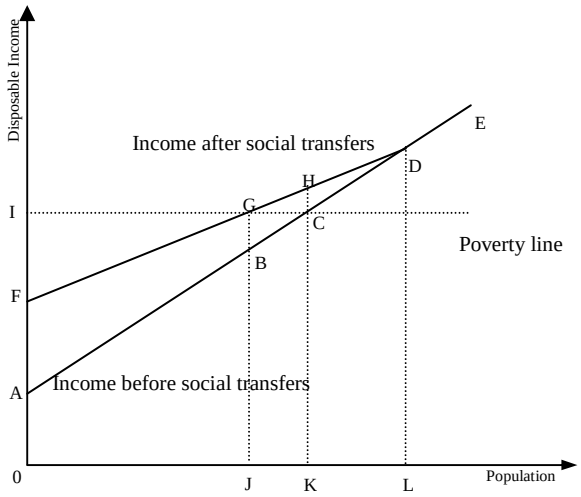
Beckerman (1979) developed the analysis framework for assessing the *poverty reduction efficiency* of social transfers, which can be defined as the measurement of the

proportion of resources channelled by a social transfer program or set of programs that effectively contributes to reduce the incidence of poverty.

Two efficiency measures for transfers on poverty reduction can be considered: the vertical efficiency of a program (VEP) and the poverty reduction efficiency (PRE). The former measures the proportion of social transfers received by households that were poor prior to the program (social transfer) and the latter measures the proportion of resources transferred that effectively contribute to the reduction of poverty.

A graphical representation eases the interpretation of both measures. On the figure 1 the horizontal axis represents individuals ranked by increasing order of income and the vertical axis represents their respective disposable income. The line *AE* represents the initial income and the line *FDE* the income after social transfers. The horizontal dot line gives the poverty line (60% of median income) and therefore the population with incomes between *0* and *I* are considered poor. The dimension of the population in poverty before social transfers is given by the distance between *0K*.

Figure 1. Beckerman Model for analysis of efficiency on social transfers



The income distribution arising from market forces before any redistributive program takes place (line *AE*) results in a deficit of resources in regard to the poverty line given by the area *ACI*. This distance between the primary distribution of income and the poverty line is denominated by "*poverty gap*".

The redistribution of disposable income resulting from the social transfer is given by the area *ADF* and originates a new income distribution illustrated by the line *FDE*. The impact of such social program in reducing the poverty gap corresponds to the area *ACGF*, as the *poverty gap* after social transfers is now given by the area *FGI*. The drop in the population in poverty equals the distance *JK* and the resulting *poverty rate* after social transfers is now given by the length of the line *0J*. The global population that benefited from the income redistribution is represented by the distance *0L*.

Following Beckerman's measures it is possible to observe that the proportion of resources redistributed by social transfers that are effectively channelled to the population in poverty after the primary distribution of income (VEP) is given by the ratio:

$$VEP = \frac{area\ ACHF}{area\ ADF} \tag{2.5}$$

The inefficiency associated to this measure concerns the relative dimension of resources that benefited the individuals that were not poor when considered the primary distribution of income. The resources misused in this sense are portrayed by the area *CDH* and the inefficiency due to eligibility criteria can be read by the distance *KL*.

Secondly, the proportion of redistributed resources that effectively reduce the poverty rate (PRE) is specified by the formula:

$$PRE = \frac{area\ ACGF}{area\ ADF} \tag{2.6}$$

The inefficiency concerning the poverty reduction efficiency concept is represented by all resources redistributed that stand above the poverty line, i.e. the area *CDG*. Furthermore, Beckerman defines as *spillover* the amount of resources above the poverty line received by individuals formerly in poverty, in the primary income distribution situation, observable in the area *CHG*.

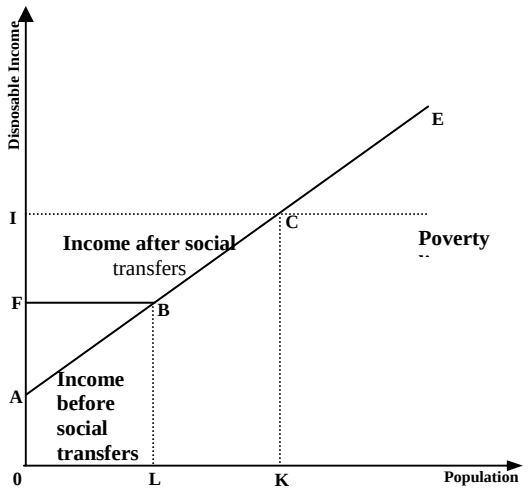
As already mentioned, the analysis on effectiveness and efficiency of social transfers are complimentary, as a high performance on the former criteria says nothing on the latter one and vice-versa.

Within the policy goals and the legal framework of both social programs in study, SII and PEB, there are specific characteristics that are relevant even in a theoretical approach to efficiency issues. The following paragraphs discuss these issues from a conceptual point of view and afterwards recovers some relevant nuances based on the main findings from applied research by Rodrigues (2001, 2004 and 2008).

In the context of the SII, given the fact that the maximum benefit amount as well as the income threshold for eligibility are significantly below the poverty line, on the one hand the expected reduction on the poverty rate may be minimum if any. On the other hand, the proportion of resources channelled to poor individuals and effectively reduces their

poverty gap is expected to be high if not total (100%). Figure 2 sketches the particular case of the SII program (Rodrigues, 2004:19).

Figure 2. Beckerman Model applied to SII

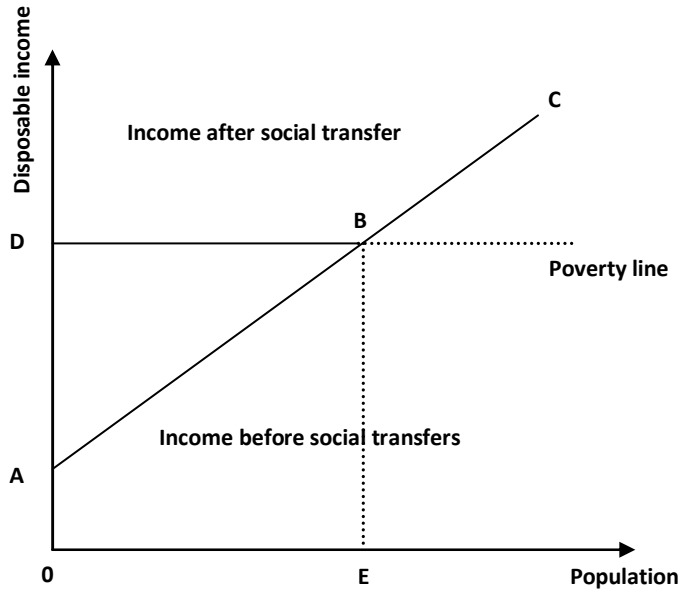


On the SII program the resources redistributed are represented by the area *ABF* and the number of beneficiaries is illustrated by the distance *0L*. The final income distribution corresponds to the line *FBE* and all resources are channelled to individuals in poverty. A reduction in the *poverty gap* can be observed but no reduction on *poverty rate* is expected as well as any *spillover* effect.

Considering a theoretical program that aims to eliminate poverty (PEB) in the whole population, through the attribution of income supplement to low incomes households until the poverty line income is reached by each beneficiary according to his/her household type. The design of this program is clearly focused on high standards of efficacy and efficiency, as it aims at retrieving from poverty every beneficiary and the amount of resources redistributed to each beneficiary is exactly the value necessary to make the disposable income equal the poverty line threshold. Consequently, the

expected efficiency and efficacy indicators of this program would high if not total (100%).

Figure 3. Beckerman Model and the theoretical representation of a poverty eradicating program



On this program the eligibility is confined to the poor population, represented by *0E* with income given by *AB*. After the redistribution of resources by this program given by the area *ABD*, the new income distribution is illustrated by the line *DBC* and the population escaping poverty is represented by *0E*.

3. Simulations of SII with different equivalence scales

This section presents the main impacts of using different equivalence scales on SII simulations. Four distributions on adult-equivalent disposable income are considered, as shown in the following table.

Table 4. Description of income distributions

Distributions	Description of income distribution
Distribution 1	Base distribution prior to SII
Distribution 2	After SII base simulation
Distribution 3	After SII simulation using the Oxford equivalence scale
Distribution 3	After SII simulation using the OECD modified equivalence scale
Distribution 4	After SII simulation using the OECD modified equivalence scale and levelling the expenditure value by distribution 2

The first two distributions are built mainly for reference purposes, as the remaining simulations will be compared primarily to the base simulation (distribution 2) and, whenever convenient, specific comparisons will also be made to the situation before SII transfers (distribution 1). The third and forth distributions differs from the base simulation exclusively on the equivalence scale used, replacing the actual SII equivalence scale respectively by the Oxford[26] and the OECD modified ones. As some degree of variance on eligibility and benefits generosity is expected in these distributions, a fifth distribution is also envisaged, using the OECD equivalence scale and levelling the expenditure on benefits supported by Social Protection System simulated on distribution 2. This assumption may be interpreted as ensuring a similar

[26] Although the Oxford equivalence scale became also known as the original OECD equivalence scale ever since it was included in OECD (1982), *The OECD list of social indicators*, Volume 1, ISBN 9264123024, 9789264123021, 124 pages, this text will keep the "Oxford" designation to ease the distinction from the OECD modified equivalence scale. This latter, for simplicity, is here designated as the "OECD equivalence scale".

level of investment, in terms on social expenditure, between the base simulation (distribution 2) and a distribution obtained through the use of a different equivalence scale (distribution 5).

3.1. Main impacts of changing equivalence scales

Before addressing differences on the use of equivalence scales some considerations on the base simulations are due. The table below shows that 3.7% of all households[27] and 4.4% of all individuals[28] are entitled to SII in the base simulation. While slightly exceeding the figures registered in administrative data for 2007 (3.6% for both[29]), these figures are close to estimates results presented in Rodrigues (2009).

Table 5. Main indicators on participation, expenditure and benefit amounts

Indicators	Distribution 2 SII base simulation	Distribution 3 SII Oxford scale simulation	Distribution 4 SII OECD scale simulation	Distribution 5 SII OECD scale simulation with expenditure levelling
No. Households	141,771	107,440	73,038	144,853
(% of total households)	*3.7%*	*2.8%*	*1.9%*	*3.7%*
No. Beneficiaries	471,090	361,781	229,612	463,642
(% of total beneficiaries)	*4.4%*	*3.4%*	*2.2%*	*4.4%*
Annual benefit expenditure (€)	315,026,544	235,865,892	154,082,527	315,000,730
Monthly average benefit amount				
per Household (€)	185.17	182.94	175.80	181.22
per Beneficiary (€)	55.73	54.33	55.92	56.62

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

The annual expenditure on SII benefit in the base simulation is around 6% below the administrative data. There are several reasons for these differences, with incomplete

[27] In SILC 2008, there are 3,877,880 households.
[28] In SILC 2008, the Portuguese population is 10,617,575.
[29] IGFSS (2008) *Conta da Segurança Social 2007.*

take-up on benefits and under-declaration of earnings being the most common referred ones. Incomplete take-up is a complex problem concerning the non use of benefits for which an individual/household is entitled to. This situation can be associated with lack of adequate information for the potential population group targeted by the social program, the complexity on application and compliance[30] procedures and the social stigma associated to political controversies around benefit-dependency, inequity towards low paid workers and fraud (Rodrigues, 2009). Under-declaration of earnings is a common problem with inquiries on income features and has been detected by the comparison of national accounts with SILC data (Rodrigues, 2008).

In order to reduce the differences between administrative data and simulations results for distribution 2, a dual approach has been followed, addressing the two main issues previously referred.

Firstly, non take-up was considered by defining a minimum benefit annual amount for take-up of 240€ by household. In the administrative data, beneficiaries receiving transfers below that minimum amount account for 2.4%, while in the base simulation prior to this non take-up fine-tuning, the percentage of beneficiaries living in households with benefits below 240€/year represented 10.3%. In order to adjust the base simulation towards the portrait set by the administrative data, either on participation and benefit amount indicators, the minimum benefit amount was introduced.

[30] Especially in what concerns the social insertion program in domains like labour insertion, vocational training, etc.

Secondly, to deal with under-declaration of earnings, a correction on earnings and minimum values of social benefits was introduced following Rodrigues (2009)[31], assuming full take-up on these benefits and compliance with the labour market legal regulations. These adjustments were controlled for potential implications on results and have no consequences on the conclusions. These adjustments are already included in the results displayed on table 5.

Considering distribution 3, based on the SII simulation with the Oxford equivalence scale, more convergent figures on individual participation with distribution 1 are obtained. As seen in table 3 (page 35) the Oxford does not differs substantially for SII equivalence scale for most household types. Moving further apart by using the OECD modified equivalence scale all indicators on participation, expenditure and average benefits fall considerable below both the administrative data and the base simulation. At a glance, distribution 5 is more similar to distribution 2, with small differences which will have a special attention on the discussion of results: higher household participation and average monthly individual benefit, lower number of beneficiaries and smaller average monthly household benefit. Nevertheless, this similarity was expected, as distribution 5 levels the global expenditure by the value obtained in the SII base simulation. As mentioned earlier, the assumption underlying this fifth distribution can be described the follows: "What would happen if the State decided to invest the same

[31] Rodrigues (2009) goes further on implementing the correction techniques described for the EUROMOD context in Figari, *et al.* (2007), namely on the splitting of benefits. The present research implemented an imputation for employees earnings according to hours worked and the national minimum wage and the existent minimum values guaranteed by law for unemployment benefits and social, disability and old-age pensions. The non splitting of households according to SII eligibility criteria can help explain the small difference of household figures (-1.9% in the base simulation) compared to the differences on beneficiaries figures (+23.6% in the base simulation).

level of resources in this redistributive program, changing only the equivalence scale used on the eligibility and calculation of benefit amount procedures?”

In general, apart from the expenditure value which is endogenous to this fifth distribution, both the number of beneficiaries and the beneficiary average monthly benefit amount on distributions 2 and 5 are quite similar. However, the increase of 3,082 households and the decrease of 7,448 beneficiaries when compared to the base simulation results reveal changes on the composition of beneficiaries with access to SII towards smaller households. These changes are analyzed in more depth in the next section and discussed on section 3.2..

One result for further discussion is the fact that the simple change of equivalence scale on distributions 3 and 4 restrains participation on SII considerably, decreases expenditure and affects the average monthly benefits.

3.1.1. The impact on the composition of eligible population for SII

One of the aims of this research concerns the understanding of the effects of using different equivalence scales on the general characteristics of individuals having access to the SII program. Typically, three dimensions come straightforward when we consider the SII beneficiaries in the different distributions: to what household types and age groups they belong and where do they stand in terms of income distribution?

Table 6. Distribution of beneficiaries by deciles of income

Distribution of beneficiaries by Decile	Distribution 2	Distribution 3	Distribution 4	Distribution 5
	SII base simulation	SII Oxford scale simulation	SII OECD scale simulation	SII OECD scale simulation with expenditure levelling
1st decile	95.5%	98.3%	98.3%	98.2%
2nd decile	4.5%	1.7%	1.7%	1.8%
3rd decile	0.0%	0.0%	0.0%	0.0%
4th decile	0.0%	0.0%	0.0%	0.0%
5th decile	0.0%	0.0%	0.0%	0.0%
6th decile	0.0%	0.0%	0.0%	0.0%
7th decile	0.0%	0.0%	0.0%	0.0%
8th decile	0.0%	0.0%	0.0%	0.0%
9th decile	0.0%	0.0%	0.0%	0.0%
10th decile	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

The distributions built with the Oxford and the OECD modified equivalence scales show a higher degree of beneficiaries' concentration on the first decile. Thus, the weight of beneficiaries on the second deciles falls from 4.5% on the base simulation to between 1.7% and 1.8% on the remaining distributions.

These results seem to imply a higher level of targeting introduced by the use of Oxford and OECD modified equivalence scales. However, to support such an assessment it is necessary to observe the participation rate by each decile, as shown in the following table, as well as the changes in income distribution discussed further ahead.

Table 7. Percentage of population on SII by deciles of Adult-equivalent disposable income

Percentage of population on SII by Decile	Distribution 2	Distribution 3	Distribution 4	Distribution 5
	SII base simulation	SII Oxford scale simulation	SII OECD scale simulation	SII OECD scale simulation with expenditure levelling
1st decile	42.4%	33.5%	21.2%	42.9%
2nd decile	2.0%	0.6%	0.4%	0.8%
3rd decile	0.0%	0.0%	0.0%	0.0%
4th decile	0.0%	0.0%	0.0%	0.0%
5th decile	0.0%	0.0%	0.0%	0.0%
6th decile	0.0%	0.0%	0.0%	0.0%
7th decile	0.0%	0.0%	0.0%	0.0%
8th decile	0.0%	0.0%	0.0%	0.0%
9th decile	0.0%	0.0%	0.0%	0.0%
10th decile	0.0%	0.0%	0.0%	0.0%
Total	4.4%	3.4%	2.2%	4.4%

Source: Instituto Nacional de Estatística - Portugal. results estimated from ICOR 2008 micro-data

In terms of population both distribution 2 and 5 show that around 40% of individuals on the first decile benefit from SII, while that proportion falls to near one third of the population on distribution 3 and one quarter on distribution 4. This latter feature reveals a significant restriction on eligibility caused by the use of the Oxford or the OECD modified equivalence scales. Only the levelled-up benefit reference threshold on distribution 5, amounting to 235.49 €, around 33% above the actual value of SII benefit reference threshold indexed to the social pension (177.05€) brings participation rates into similar levels observed in the SII base simulation. That former benefit reference threshold was endogenously obtained in the simulation model by levelling total expenditure on distribution 5 by the value observed in distribution 2. Another important result when comparing these two distributions and taking in consideration the information on tables 5, 6 and 7 is that, despite granting eligibility to less individuals,

distribution 5 gives access to SII to a higher number of persons belonging to the first decile. The level of targeting is thus higher and composition effects on SII participation are evident.

Another important perspective on the SII participation concerns the household type. The table below shows single adult household beneficiaries to have a much higher representation on SII beneficiaries in distributions using the Oxford or OECD scales. On a lower level that difference is also shown on single parents.

Table 8. Distribution of SII beneficiaries by household type

Distribution of beneficiaries by household type	Distribution 2	Distribution 3	Distribution 4	Distribution 5
	SII base simulation	SII Oxford scale simulation	SII OECD scale simulation	SII OECD scale simulation with expenditure levelling
Single adult	2.4%	3.2%	5.0%	12.4%
Two adults. both under 65 years old	8.4%	7.2%	10.4%	12.3%
Two adults. at least one adult over 65 years old	4.4%	3.2%	2.0%	7.1%
Other households without dependent children	3.3%	4.2%	1.4%	3.5%
Single parent with one or more children	9.7%	11.7%	14.1%	12.4%
Two adults with one dependent child	12.0%	10.2%	11.2%	12.6%
Two adults with two dependent children	27.7%	25.3%	26.1%	20.1%
Two adults with three or more dependent children	18.1%	21.7%	23.4%	10.2%
Other households with dependent children	14.1%	13.3%	6.5%	9.5%
Total	100.0%	100.0%	100.0%	100.0%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

Although in all simulations single parents and two parents families with three or more children have a higher participation rate than any other household type, in comparative terms distribution 5 seems to privilege small households with or without children while distribution 2 privileges large families with children. From a demographic perspective

(table 9) single adult households registered the more significant positive differences on SII participation between distribution 5 and the base simulation, while the opposite occurs mainly on two adults with three or more children households. Due to their stricter conditions on eligibility distributions 3 and 4 decrease participation in all types of households, except single adult household and other households without dependent children for distribution 3.

Table 9. Participation rate by household type

Participation rate by household type	Distribution 2	Distribution 3	Distribution 4	Distribution 5
	SII base simulation	SII Oxford scale simulation	SII OECD scale simulation	SII OECD scale simulation with expenditure levelling
Single adult	1.7%	1.7%	1.7%	2.6%
Two adults. both under 65 years old	4.2%	2.8%	2.5%	3.8%
Two adults. at least one adult over 65 years old	1.7%	1.0%	0.4%	1.7%
Other households without dependent children	0.8%	0.8%	0.2%	0.9%
Single parent with one or more children	15.7%	14.5%	11.1%	15.4%
Two adults with one dependent child	3.4%	2.2%	1.5%	3.3%
Two adults with two dependent children	7.5%	5.3%	3.5%	6.7%
Two adults with three or more dependent children	20.5%	19.0%	12.9%	18.6%
Other households with dependent children	3.9%	2.8%	0.9%	3.8%
Total	4.4%	3.4%	2.2%	3.7%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

In what concerns the age perspective and considering the age groups presented on the table below and comparing distribution 2 to distribution 5, differences are very small, only observable with two decimal figures. The latter distribution gives more weight to 16-24, 45-64 and 65 and over age groups while children and adults aged between 24 and 44 have higher levels of participation on SII base simulation. Once again the mere change of equivalence scales reduces eligibility for all age groups. In particular the use

of the OECD modified scale (distribution 4) reduces SII participation to levels around 50% of the values observed in the SII base simulation.

Table 10. Percentage of population on SII by age group

Percentage of population on SII by Age	Distribution 2	Distribution 3	Distribution 4	Distribution 5
	SII base simulation	SII Oxford scale simulation	SII OECD scale simulation	SII OECD scale simulation with expenditure levelling
Less than 16 years	8.92%	7.24%	4.87%	8.60%
Between 16 and 24 years	5.38%	4.11%	2.15%	5.40%
Between 25 and 44 years	4.45%	3.41%	2.26%	4.32%
Between 45 and 64 years	3.56%	2.57%	1.59%	3.62%
65 years and over	0.88%	0.58%	0.29%	0.91%
Total	4.44%	3.41%	2.16%	4.37%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

In terms of age composition of SII beneficiaries the main difference concerns the population aged 65 years and over. Comparing SII base simulation and distribution 5, in the latter all age groups have higher weight on the composition of beneficiaries, except for the children and youth and 25-44 age group.

Table 11. Distribution of beneficiaries

Distribution of beneficiaries by Decile	Distribution 2	Distribution 3	Distribution 4	Distribution 5
	SII base simulation	SII Oxford scale simulation	SII OECD scale simulation	SII OECD scale simulation with expenditure levelling
Less than 16 years	32.99%	34.86%	36.93%	32.31%
Between 16 and 24 years	12.84%	12.78%	10.52%	13.10%
Between 25 and 44 years	30.41%	30.31%	31.62%	29.97%
Between 45 and 64 years	20.31%	19.11%	18.64%	20.98%
65 years and over	3.46%	2.94%	2.30%	3.65%
Total	100.00%	100.00%	100.00%	100.00%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

Besides the composition effects presented so far, it is necessary to investigate a possible "generosity effect" in what concerns the resources being redistributed. As seen on table 5, changing solely the equivalence scale from the SII base simulation results in a considerable reduction on social expenditure and also in lower average amounts transferred to individuals and households. In the following table, that result can be observed when comparing the change on mean incomes estimated on the 1st decile with the SII base simulation (17.1% increase) and with distribution 5 (16.6% increase). Again, as distribution 5 levels-up the expenditure value to similar levels estimated on distribution 2, the results show a higher convergence between average benefit levels (table 5) and adult-equivalent mean disposable income in the first decile.

Table 12. Income distribution by deciles of adult-equivalent disposable income - mean

Income distribution by Decile	Distribution 1	Distribution 2		Distribution 3		Distribution 4		Distribution 5	
	ICOR without SII	SII base simulation		SII Oxford scale simulation		SII OECD scale simulation		SII OECD scale simulation with expenditure levelling	
	€	€	Δ%	€	Δ%	€	Δ%	€	Δ%
1st decile	2,920	3,419	17.1%	3,296	12.9%	3,160	8.2%	3,406	16.6%
2nd decile	4,629	4,639	0.2%	4,635	0.1%	4,633	0.1%	4,638	0.2%
3rd decile	5,681	5,681	0.0%	5,681	0.0%	5,681	0.0%	5,681	0.0%
4th decile	6,713	6,713	0.0%	6,713	0.0%	6,713	0.0%	6,713	0.0%
5th decile	7,739	7,739	0.0%	7,739	0.0%	7,739	0.0%	7,739	0.0%
6th decile	8,923	8,923	0.0%	8,923	0.0%	8,923	0.0%	8,923	0.0%
7th decile	10,252	10,252	0.0%	10,252	0.0%	10,252	0.0%	10,252	0.0%
8th decile	12,367	12,367	0.0%	12,367	0.0%	12,364	0.0%	12,367	0.0%
9th decile	15,896	15,896	0.0%	15,896	0.0%	15,896	0.0%	15,896	0.0%
10th decile	29,484	29,484	0.0%	29,484	0.0%	29,484	0.0%	29,484	0.0%
Total	10,459	10,510	0.5%	10,497	0.4%	10,483	0.2%	10,508	0.5%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

It is possible to observe that changing solely the equivalence scales results in less redistribution of income.

These results demonstrate the existence of compositional effects on SII beneficiaries and on the profile of redistribution amounts induced by changing equivalence scales. The next stage of this research addresses the investigation of impacts on poverty indicators resulting from similar changes.

3.1.2. The impact on poverty measures

For the analysis on the impacts on poverty resulting from redesigning the SII through the use of different equivalence scales, distributions 3 and 4, and combining the latter with the same level of spending (distribution 5) observed in the SII base simulation, the Foster-Greer-Thorbecke (FGT) indicators are used.

These indicators are read as measures on efficacy of redistributive programs in fighting poverty. However, they they should be considered within the framework of SII main objective, which is to ensure a certain temporary level of resources while a labour insertion program is executed in order to empower individuals/households to earn enough resources to live above SII reference threshold standards. In addition, as mentioned before, the SII reference threshold standard is below the poverty line and thus this program has not a poverty elimination purpose but rather a poverty alleviating purpose. In this context, the intensity of poverty indicator is of particular importance.

Table 13. Indicators on efficacy (FGT)

Indicators	Distribution 1	Distribution 2	Distribution 3	Distribution 4	Distribution 5
	ICOR without SII	SII base simulation	SII Oxford scale simulation	SII OECD scale simulation	SII OECD scale simulation with expenditure levelling
Poverty					
Incidence	17.9%	17.9%	17.9%	17.9%	17.9%
Intensity	4.88%	3.87%	4.12%	4.39%	3.90%
Severity	2.20%	1.18%	1.36%	1.59%	1.19%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

The table above shows that no impact on poverty rates was observed with reference to the base simulation. Notwithstanding, all redistributive simulations had different impacts on the remaining indicators, reducing the intensity and severity of poverty experienced by SII beneficiaries and general society. The SII base simulation stands out as the most effective in lowering the intensity of poverty to 3.87%, with a reduction of 1.01 percentage points. Comparatively, distribution 3 decreases only 0.76 percentage points, achieving 4.12% while distribution 4 reduces 0.6 percentage points to 4.28% and distribution 5 reduces 0.98 percentage points to 3.90%. Based on these indicators, the use of SII own equivalence scale seems to be more effective in poverty alleviating, by further reducing the intensity of poverty and the severity of poverty when compared to simulations using either the Oxford or OECD modified equivalence scales.

Table 14. Selected Laeken indicators for financial poverty

Laeken indicators	Distribution 1	Distribution 2	Distribution 3	Distribution 4	Distribution 5
	ICOR without SII	SII base simulation	SII Oxford scale simulation	SII OECD scale simulation	SII OECD scale simulation with expenditure levelling
At-risk-of-poverty rate	17.9%	17.9%	17.9%	17.9%	17.9%
Relative at-risk-of-poverty gap	21.46%	20.82%	21.21%	21.28%	20.86%
Dispersion around the at-risk-of-poverty threshold					
40% of median	5.58%	4.15%	4.74%	5.37%	4.21%
50% of median	10.97%	10.56%	10.81%	10.93%	10.66%
70% of median	26.50%	26.46%	26.46%	26.46%	26.46%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

The table above displays a selection Laeken indicators for financial poverty that corroborates previous findings based on FGT indicators.

3.1.3. The impact on efficiency assessment of redistributive policies

In what concerns efficiency indicators that provide information on the proportion of redistributed resources that is effectively working to reduce poverty and/or reduce the poverty gap, all distributions rank very high.

Table 15. Indicators on efficiency (Beckerman)

Indicators	Distribution 2	Distribution 3	Distribution 4	Distribution 5
	SII base simulation	SII Oxford scale simulation	SII OECD scale simulation	SII OECD scale simulation with expenditure levelling
Beckerman				
VEP	99.87%	100.00%	100.00%	100.00%
PRE	99.21%	99.29%	99.35%	99.35%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

The VEP indicator shows that all simulations with the Oxford or the OECD scales are fully allocating transfers to poor households and individuals, while the PRE indicator states the existence of very low levels of spillover. This latter result was already expected due to the absence of a significant variation on poverty rate. Nevertheless, both alternative equivalence scales produce better results in both efficiency indicators when compared to the SII equivalence scale (distribution 2). In distributions 3 and 4, these results were expected as considerable restrains on participation and benefit amounts were observed. However, in distribution 5 it is redistributed a similar level of resources as in SII base simulation, but its better targeting ensures that all SII beneficiaries were, in fact, poor prior to SII.

3.2. Discussion of results and questions for future research

The different levels of access to SII given to each household typology and age group in the four simulations reveal the importance of choosing the equivalence scale on the results of a social redistributive program of this nature.

In a nutshell, adopting the Oxford or OECD modified equivalence scales on SII awards different levels of eligibility to household's type, age groups and population in the first two deciles of adult-equivalent disposable income implying necessarily a redefinition of the SII beneficiaries' composition. In order to further understand these results it is important to go back to the origin of these changes - the equivalence scales - and discuss them in the specific context of SII.

One essential feature of SII concerns the equivalence scale's dual role: it modifies the eligibility condition and simultaneously it changes the calculation of the benefit amount.

This latter characteristic is of the utmost importance as it is equal to state that each household type and dimension has a different maximum benefit amount it can afford.

In order to further understand the implication of this dual role it is essential to review the eligibility condition and the formula for computing the benefit amount. Eligibility to SII is granted if the following condition applies:

$$Household\ reference\ income < SII\ reference\ threshold$$

Assuming the following notation:

Y – Household reference income

$R.T.$ – SII reference threshold

y – individual/household income components relevant for SII in a given household

a – number of adult-equivalent elements in the household

Considering the formula for household reference income:

$$Y = \frac{\sum y}{a} \tag{3.1}$$

Then, eligibility condition is verified if:

$$\frac{\sum y}{a} < R.T. \tag{3.2}$$

Then it is correct to say that the eligibility status is approved if:

$$\sum y < R.T. \times a \tag{3.3}$$

Therefore, for each household composition, eligibility is obtained if the sum of all income components considered in SII means-test is below a "relevant benefit threshold". This relevant benefit threshold equals the product of the benefit reference threshold (social pension) and the dimension of each household in adult-equivalent units. In conclusion, the relevant benefit threshold varies with the equivalence scale used to calculate the number of adult-equivalent elements in the households.

Bearing in mind the dual role of equivalence scales, the calculation of benefit amounts follows the same logic.

Let *B* stand for the benefit amount for a given household:

$$B = (R.T. \times a) - \sum y \tag{3.4}$$

An essential conclusion is what can be designated by "generosity effect" as different scales imply different threshold benefits for each family composition. Accordingly, considering distributions 2 to 4, the distributions that differ exclusively on the equivalence scales, the SII equivalence scale is more generous for all household types, with the exception of single adult and single parents when compared to the Oxford equivalence scale and single adult when compared to the OECD modified scale, where the economies of scale considered are equal. Within these three distributions it is clear that distribution 2 builds up a more generous program, with more favourable eligibility and benefit amount standards. Therefore, distributions 3 and 4 both reduce the

eligibility scope, giving entitlements to less households and beneficiaries in comparison to SII base simulation, and the amount of benefits paid, as shown either on the global expenditure or on average benefit amounts observed on table 5. The following table illustrates the relevant benefit thresholds for a set of representative households, measured in Euros for the three equivalence scales used and also for the different benefit reference threshold adopted on distribution 5.

Table 16. Eligibility/benefit relevant thresholds by household type

Eligibility/benefit thresholds by household type/dimension	Eligibility/benefit thresholds						
	Dist. 2	Dist. 3	Dif (%D.1)	Dist. 4	Dif (%D.1)	Dist. 5	Dif (%D.1)
Single adult	177.05 €	177.05 €	0%	177.05 €	0%	235.49 €	33%
Two adults	354.10 €	300.99 €	-15%	265.58 €	-25%	353.24 €	0%
Three adults	478.04 €	424.92 €	-11%	354.10 €	-26%	470.98 €	-1%
Single parent with one child	265.58 €	265.58 €	0%	230.17 €	-13%	306.14 €	15%
Single parent with two children	354.10 €	354.10 €	0%	283.28 €	-20%	376.78 €	6%
Two adults with one dependent child	442.63 €	389.51 €	-12%	318.69 €	-28%	423.88 €	-4%
Two adults with two dependent children	531.15 €	478.04 €	-10%	371.81 €	-30%	494.53 €	-7%
Two adults with three dependent children	637.38 €	566.56 €	-11%	424.92 €	-33%	565.18 €	-11%
Three adults with one dependent child	566.56 €	513.45 €	-9%	407.22 €	-28%	541.63 €	-4%
Three adults with two dependent children	655.09 €	601.97 €	-8%	460.33 €	-30%	612.27 €	-7%
Three adults with three dependent children	761.32 €	690.50 €	-9%	513.45 €	-33%	682.92 €	-10%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

The table above provides support for the compositional adjustments on SII beneficiaries that result from changing the equivalence scale (distributions 3 and 4) and from combining that change with a levelled-up benefit reference threshold (distribution 5).

Considering distribution 2 as the reference for comparison, in distribution 3 all eligibility thresholds and maximum benefit amounts are reduced, with the sole

exception of the single adult and single parent household. For the remaining household types presented in the last table these decreases range from 8% to 15%.

Considering distribution 4 for comparison with distribution 2, all eligibility thresholds and maximum benefit amounts suffer considerable reductions, with the sole exception of the single adult household. For the remaining household types presented in the last table these decreases range from 13% to 33%, illustrating the deviation from distribution 2 to be positively related with the number of elements in the households

Comparing distribution 5 to distribution 2, the differences are more moderate and the higher benefit reference threshold makes some household types better off than observed in the SII base simulation. In fact, this reference threshold rises from 177.05€ (social pension) to 235.49€ in distribution 5, ensuring approximately the same level of global expenditure, increasing the potential benefits of small households namely the single adult household (+33%) and single parent with one (+15%) or two children households (+6%). Thus, changes in equivalence scales produce similar impacts as changes on benefit reference threshold for each household type and dimension.

The results reveal the importance of the dual role of equivalence scale on the composition of beneficiaries and the generosity of benefits. Besides its importance in poverty assessment, when considering the policy design context, equivalences scales have proven to be an essential targeting tool for means-test redistributive policies.

However, it should be taken in consideration that this particular feature of redistributive policy design is not universal: not all redistributive policies assign that dual role to equivalence scales. In fact, some redistributive policy measures in Portugal have the benefit amount more or less isolated from the equivalence scale, restraining its role for

eligibility procedures. The social pension is one of those examples, as the benefit amount is fixed and does not vary with the household composition.

Therefore, one area for further research is the role of equivalence scales on different types of redistributive programs, such as social pension, family allowances, etc. and discuss its effects on beneficiaries' composition and poverty indicators.

On the specific case of SII, the generosity effect is positive for the SII own equivalence scale. When compared to distributions 3, 4 and 5, SII base simulation differentiates positively a set of household types with a higher demographic weight on the Portuguese poor population, as larger families with or without children. As these household types account also for a higher share on the poverty gap, the SII equivalence scale compares positively in the efficacy criteria, as it further reduces the intensity and severity of poverty in a context where efficiency is very high for all distributions computed.

Therefore, the results show that there is no gain in efficacy and little gains on efficiency criteria in SII by introducing the same equivalence scale as the one used on the calculation of the income distribution for computing poverty indicators (OECD modified equivalence scale) or an intermediate scale, such as the Oxford/OECD original equivalence scale.

In view of the evidence produced, these results emerge from differences on income aggregates used by the SII program. Firstly, it does not aim at reducing poverty incidence and therefore its benefit reference threshold represents only approximately 29% of the poverty line. In a program of this nature, based on complementarily use of households' income and benefits but also conditioned by such low levels of benefits, inefficiency is hardly a problem. Secondly, household reference income is quite

different from the income aggregate used on calculating the income distribution. The former disregards family allowances, educational and housing subsidies and refers to gross values while the latter encompasses all income monetary components and refers to disposable income. These two main differences play an important role on the assessment made in this section and interfere with the evaluation on the use of different equivalence scales in redistributive programs. For that reason, the next section explores this rational, making a similar evaluation to a program with the same operational logical of SII but introducing two major adjustments: firstly, aiming the eradication of poverty and secondly, considering all income components that incorporate the household disposable income.

4. Simulation of a theoretical distributive program aimed at eradicating poverty: an extension of SII

4.1. Introduction

As seen in section 3, when considering the criteria for SII and for building the income distribution, three definitions matter the most: the equivalence scale, the reference income and the benefit reference threshold.

To fully understand the impact of varying the equivalence scales, it is useful to try to eliminate the effects produced by the remaining differences. Therefore, this section will simulate a program designed to ensure all households are assessed by their global disposable (net) income, are eligible if that disposable income is below the relevant poverty threshold and are entitled to a benefit amount equal to the difference between the relevant poverty threshold and their disposable income. For simplicity, this theoretical program is designated Poverty Eradicating Benefit (PEB). From a social

policy perspective PEB corresponds to a citizenship minimum income designed to eliminate relative poverty. Taking in consideration the nature of this benefit and its ambitious goal, it is important to restate the assumption of no behaviour change in the simulations, especially in what concerns to labour market participation, poverty, inactivity and unemployment traps.

4.2. Specifications

Initially two distributions are built in this exercise: a first simulation with SII equivalence scale (distribution A) and a second simulation with OECD modified equivalence scale (distribution B). If optimal results are observed in distribution B sequential distributions will be calculated, with detailed results in annex II, for investigating the effects of moving away from the OECD modified scale, or more generally, the impacts of departing from the equivalence scale used on the income distribution calculation.

Bearing in mind that the purpose of the program simulated on this exercise is to eradicate poverty, the restriction previously applied to a certain minimum value of benefit for take-up is eliminated. Otherwise, some poverty would prevail, even if the poverty gap would be very low.

The calculation formula for PEB follows the logic of SII as the benefit amount is calculated by the difference between the level of reference household income and the threshold considered relevant for the characteristics of that household. A benefit design based on complementarily of resources is clearly efficiency-driven and its adequacy depends on the correct identification of reference income, the choice of an appropriate

benefit reference threshold and the choice of an equivalence scale, which is the main subject underlying this research.

Based on the results from section 3, it is possible to state that fully understanding the impact of changing equivalence scales is a complex process, at least due to its sensibility to the choice of income references. In order to prevent side effects resulting from differences in the definition of either the reference income or the benefit reference threshold, the former is identical to the income used to build the income distribution and the latter is indexed to the main referential of social policy assessment chosen in this exercise. Therefore, the reference income is equal to the disposable income from EU-SILC 2008 deducted of any SII transfer and the benefit reference threshold equals the poverty threshold calculated as 60% of median disposable income from EU-SILC 2008 deducted of any SII transfer. Naturally, SII and OECD modified equivalence scales are used for adjustment of income in the eligibility conditions and benefit amount calculations.

4.3. Simulations

As expected in a program with the goal of eradicating poverty in Portugal, participation rates are considerable in both distributions and social expenditure is reasonably higher then observed on SII calculations.

Table 17. Main indicators on participation, expenditure and benefit amounts

Indicators	Distribution A Simulation with SII E. S.	Distribution B Simulation with OECD mod. E. S.
No. Households	1,255,440	735,278
(% of total households)	*32.4%*	*19.0%*
No. Beneficiaries	3,534,768	1,905,456
(% of total beneficiaries)	*33.3%*	*17.9%*
Annual benefit expenditure (€)	4,426,753,799	1,679,502,983
Monthly average benefit amount		
per Household (€)	293.84	190.35
per Beneficiary (€)	104.36	73.45

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

In distribution A, around one third of Portuguese households and individuals are entitled to PEB, with a total expenditure amounting to 3.4% of 2007 Portuguese Gross Domestic Product (GDP[32]). There is a considerable increase in the participation base, representing 7.5 times the number of SII beneficiaries calculated in SII base simulation. It is also noticeable the increase in average monthly benefits, growing 58.7% for households and 56.4% for beneficiaries. Although part of this impact is due to the elimination of the previous take-up restriction, 33.3% of the Portuguese population exceeds clearly the percentage of poor individuals (17,9%) prior to PEB.

Considering distribution B, participation figures are close to data regarding poverty incidence, encompassing 19.0% of households and 17.9% of population. The expenditure estimated with this program accounts to 1.3% of 2007 GDP and monthly average figures increase 2.8% for household and 39.7% for beneficiaries in comparison to SII base simulation figures presented on table 5.

[32] In 2007, the Portuguese Gross Domestic Product at market prices was 131,991,229 thousand Euros.

Table 18. Distribution of PEB beneficiaries by deciles of adult-equivalent disposable income

Distribution of beneficiaries by Decile	Distribution A Simulation with SII E. S.	Distribution B Simulation with OECD mod. E. S.
1st decile	30.1%	55.7%
2nd decile	29.6%	44.3%
3rd decile	26.4%	0.0%
4th decile	14.0%	0.0%
5th decile	0.0%	0.0%
6th decile	0.0%	0.0%
7th decile	0.0%	0.0%
8th decile	0.0%	0.0%
9th decile	0.0%	0.0%
10th decile	0.0%	0.0%
Total	100.0%	100.0%

Source: Instituto Nacional de Estatística – Portugal, results estimated from ICOR 2008 micro-data

The considerable widening of beneficiaries across the income distribution is clearly observable in the table above. In distribution A, the beneficiaries are quite spread over the first four deciles, while in distribution B, more than 99.8% of all beneficiaries belong to the first two deciles.

Considering the table below, all the people in the first decile plus the majority of persons in the second and third deciles and almost half the individuals on the fourth decile would benefit from PEB in distribution A. The use of OECD modified equivalence scale results in encompassing the total population on the first decile and a high proportion on the second.

Table 19. Proportion of population participating on PEB by decile

Percentage of population on SII by Decile	Distribution A Simulation with SII E. S.	Distribution B Simulation with OECD mod. E. S.
1st decile	100.0%	100.0%
2nd decile	98.4%	79.4%
3rd decile	87.7%	0.0%
4th decile	46.8%	0.0%
5th decile	0.0%	0.0%
6th decile	0.0%	0.0%
7th decile	0.0%	0.0%
8th decile	0.0%	0.0%
9th decile	0.0%	0.0%
10th decile	0.0%	0.0%
Total	33.3%	17.9%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

In what concerns the participation on PEB by household type, no differences are found on single adults, as the equivalence scales are equal for this case. Both distributions equal the proportion of poor population within single adult households. In every other household type, distribution A surpasses considerably the percentage of poor individuals within each household type, due to the more generous equivalence scale. By contrast, the participation rate from distribution B depicts almost perfectly the incidence of poverty (prior to PEB) within the several household types, thus exhibiting a high level of targeting.

Table 20. Participation rate by household type

Participation rate by household type	Distribution A	Distribution B	Population in poverty
	Simulation with SII E. S.	Simulation with OECD mod. E. S.	
Single adult	27.4%	27.4%	27.4%
Two adults, both under 65 years old	28.0%	16.2%	16.2%
Two adults, at least one adult over 65 years old	42.7%	21.2%	21.2%
Other households without dependent children	19.0%	6.5%	6.5%
Single parent with one or more children	51.5%	39.9%	39.9%
Two adults with one dependent child	31.1%	15.4%	15.4%
Two adults with two dependent children	37.7%	19.8%	19.8%
Two adults with three or more dependent children	51.6%	33.0%	33.0%
Other households with dependent children	38.4%	19.2%	19.2%
Total	33.3%	17.9%	17.9%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

Through the table below is possible to compare the composition of PEB beneficiaries by household types in each distribution with the distributions of poor population and the general population by household type. Again the similitude between the allocation of PEB beneficiaries on distribution B and the composition of poor population by household is very clear. The complexity of the equivalence scale used on SII and its special generosity towards families with more children and larger households can explain some differences observed when compared either with poor or general populations.

Table 21. Distribution of PEB beneficiaries by household type

Distribution of beneficiaries by household type	Distribution A	Distribution B	Population in poverty	Population
	Simulation with SII E. S.	Simulation with OECD mod. E. S.		
Single adult	5.3%	9.8%	9.8%	6.4%
Two adults, both under 65 years old	7.4%	8.0%	8.0%	8.8%
Two adults, at least one adult over 65 years old	14.7%	13.6%	13.6%	11.5%
Other households without dependent children	10.7%	6.7%	6.7%	18.6%
Single parent with one or more children	4.3%	6.1%	6.1%	2.7%
Two adults with one dependent child	14.7%	13.5%	13.5%	15.7%
Two adults with two dependent children	18.4%	18.0%	18.0%	16.3%
Two adults with three or more dependent children	6.1%	7.2%	7.2%	3.9%
Other households with dependent children	18.6%	17.2%	17.2%	16.1%
Total	100.0%	100.0%	100.0%	100.0%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

Although targeting is a relevant and necessary component for a redistributive program designed with efficiency purposes, another key point is the amount of resources transferred, i.e. the adequacy of transfers. One the one hand, too much transfer of resources may ensure effectiveness in poverty reduction but can seriously ruin efficiency standards and exacerbate costs jeopardizing the program sustainability. On the other hand, too little transfer of resources may have a small or no effect on poverty rate, reducing at most the poverty gap and poverty severity, as previously observed in the SII simulations.

Table 22 shows the mean adult-equivalent disposable income by decile prior to PEB. On distribution A the allocation of resources ensures a mean adult-equivalent disposable income superior to 6.500 in the whole income distribution, whereas distribution 1[33] shows that previous to PEB only households on the forth decile would be able to have

[33] For more details on distribution 1 see section 3.

access to that level of income. Furthermore, those results place the mean indicators well above the poverty threshold fixed at a adult-equivalent disposable income of 4,975.04, pointing out for an over-shooting of PEB on distribution A and inefficient use of transfers to non-poor population mainly on the third and forth deciles. Nevertheless, PEB will not affect individuals around median adult-equivalent disposable income (8,291.73) and consequently the re-ranking produced will have no effect on the poverty threshold.

Conversely on distribution B transfers have significant impact only on the first two deciles, resulting on mean adult-equivalent disposable incomes slightly above the poverty threshold.

Table 22. Mean income distribution by deciles of adult-equivalent disposable income

Income distribution by Decile	Distribution 1	Distribution A		Distribution B	
	ICOR without PEB	Simulation with SII E. S.		Simulation with OECD mod. E. S.	
	€	€	Δ%	€	Δ%
1st decile	2,920	6,505	122.8%	4,975	70.4%
2nd decile	4,629	6,557	41.6%	4,999	8.0%
3rd decile	5,681	6,659	17.2%	5,681	0.0%
4th decile	6,713	6,861	2.2%	6,713	0.0%
5th decile	7,739	7,739	0.0%	7,739	0.0%
6th decile	8,923	8,923	0.0%	8,923	0.0%
7th decile	10,252	10,252	0.0%	10,252	0.0%
8th decile	12,364	12,364	0.0%	12,364	0.0%
9th decile	15,896	15,896	0.0%	15,896	0.0%
10th decile	29,484	29,484	0.0%	29,484	0.0%
Total	10,459	11,123	6.3%	10,701	2.3%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

When the effectiveness of PEB is considered and both distributions are compared on the basis of Foster-Greer-Thorbecke indicators on poverty, the results are a clear-cut eradication of poverty and its associated gap and severity components. Under the general conditions defined by the redistributive program simulated, either equivalence scale allows a complete success in eliminating poverty.

Table 23. Indicators on efficacy

Indicators	Distribution 1	Distribution A	Distribution B
	ICOR without PEB	Simulation with SII E. S.	Simulation with OECD mod. E. S.
Poverty			
Incidence	17.95%	0.00%	0.00%
Intensity	4.88%	0.00%	0.00%
Severity	2.20%	0.00%	0.00%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

Apart from the composition effects already discussed and considering exclusively poverty reduction goals, the conclusion that effectiveness indicators are completely satisfactory, renders the differences on efficiency parameters as the main issue on the global assessment on the two versions of PEB.

Before addressing the Beckerman analysis, table 24 presents the set of selected Laeken indicators for financial poverty. As expected, most indicators on poverty are equal to zero, but a relevant feature is observable on the dispersion around the at-risk-of-poverty threshold: both distributions ensure poverty eradication when the threshold is set equal or below 60% of median adult-equivalent disposable income but there is a substantial difference in poverty rates on the higher threshold at 70% of median adult-equivalent disposable income. The simulation with the SII equivalence scale still reduces poverty

very significantly when compared to distribution 1, whereas the simulation with the OECD modified scales does not reduce the poverty rate at all for that higher threshold.

Table 24. Selected Laeken indicators for financial poverty

Laeken indicators	Distribution 1	Distribution A	Distribution B
	ICOR without PEB	Simulation with SII E. S.	Simulation with OECD mod. E. S.
At-risk-of-poverty rate	17.95%	0.00%	0.00%
Relative at-risk-of-poverty gap	21.46%	0.00%	0.00%
Dispersion around the at-risk-of-poverty threshold			
40% of median	5.58%	0.00%	0.00%
50% of median	10.97%	0.00%	0.00%
70% of median	26.50%	2.76%	26.50%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

These results point to a very strict targeting and control on the level of resources channelled in the simulation with OECD scale, as the PEB purpose was to ensure every individual/household would have enough resources to achieve the poverty threshold set at 60% of median adult-equivalent disposable income. Therefore, at 70% of median adult-equivalent disposable income no individual/household was better off than prior to PEB in what concerns poverty incidence. On the contrary, distribution A shows the redistribution impacts do not stop when individuals/households achieve the 60% of median adult-equivalent disposable income threshold and thus beneficiaries receive income above the benefit reference threshold which corresponds to the original at-risk-of-poverty threshold.

The key issue is the volume of resources spent by the program that do not have any impact on poverty reduction, whether because initially benefits were attributed to non-poor population or because the benefit amounts exceeds the value of transfers that

would ensure an adult-equivalent disposable income equal to the poverty threshold. While the former phenomena is related to issues of targeting and eligibility conditions, the latter concerns the *spillover* effect, associated with the over-shooting profile observed in the income distribution by decile observed in table 22.

Beside the differences on the global amount of resources spent on both distributions, the following table shows that the proportion of monetary resources allocated individuals in poverty is also quite distinct. In distribution A 20.86% of total expenditures is transferred to non-poor population, whereas distribution B shows the inefficiency based on bad targeting is null.

Table 25. Main indicators for effectiveness assessment - Beckerman

Indicators	Distribution A	Distribution B
	Simulation with SII E. S.	Simulation with OECD mod. E. S.
Total amount of transfers	4,426,753,799	1,679,502,983
Total amount of transfers to poor population	3,503,361,775	1,679,502,983
Resources spent with non-poor population	923,392,025	0
in % of total transfer	*20.86%*	*0.00%*
Poverty Gap before PEB	982,705,549	982,705,549
Poverty Gap after PEB	0	0
Reduction of the Poverty Gap	982,705,549	982,705,549
Total amount of Spillover	921,012,090	29,411
in % of total transfer	*20.81%*	*0.00%*
Beckerman		
VEP	79.1%	100.0%
PRE	58.3%	100.0%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

As expected from the Foster-Greer-Thorbecke indicators the poverty gap is completely eliminated by both versions of PEB, but the *spillover* amounts are quite different. In

distribution A little more than one fifth of expenditure is transferred in excess of individuals needs to escape poverty, whereas that excess represents 0,0% of expenditure on distribution B.

Beckerman indicators illustrate those efficiency effects quite clearly. On the Vertical Efficiency of the Program, distribution B scores about 100% while distribution A stays at 79.1%. On the Poverty Reduction Efficiency, distribution B remains above 99%, while distribution A scores 58.3%. If the global inefficiency on distribution B is almost non-existent, the inefficiency on distribution A is quite wide, representing around 41.7% of the program's expenditure and 1.4% of GDP.

4.4. Discussion of results and questions for future research

The results indicate that, in programs designed for poverty eradication, the choice of the equivalence scale is quite sensible, as it interferes with targeting and adequacy of transfers.

Based on a theoretical redistributive program simulation that exhibits the same approach on complementarily of benefits and households income before benefits on poverty and/or social exclusion as SII and fine tuning the concepts of income so that the definition of reference income for eligibility and calculation of benefit amounts were aligned by the same standards used in building the income distribution for poverty analysis, the results point to use of OECD modified equivalence scale as the most adequate for ensuring efficiency on transfer of resources.

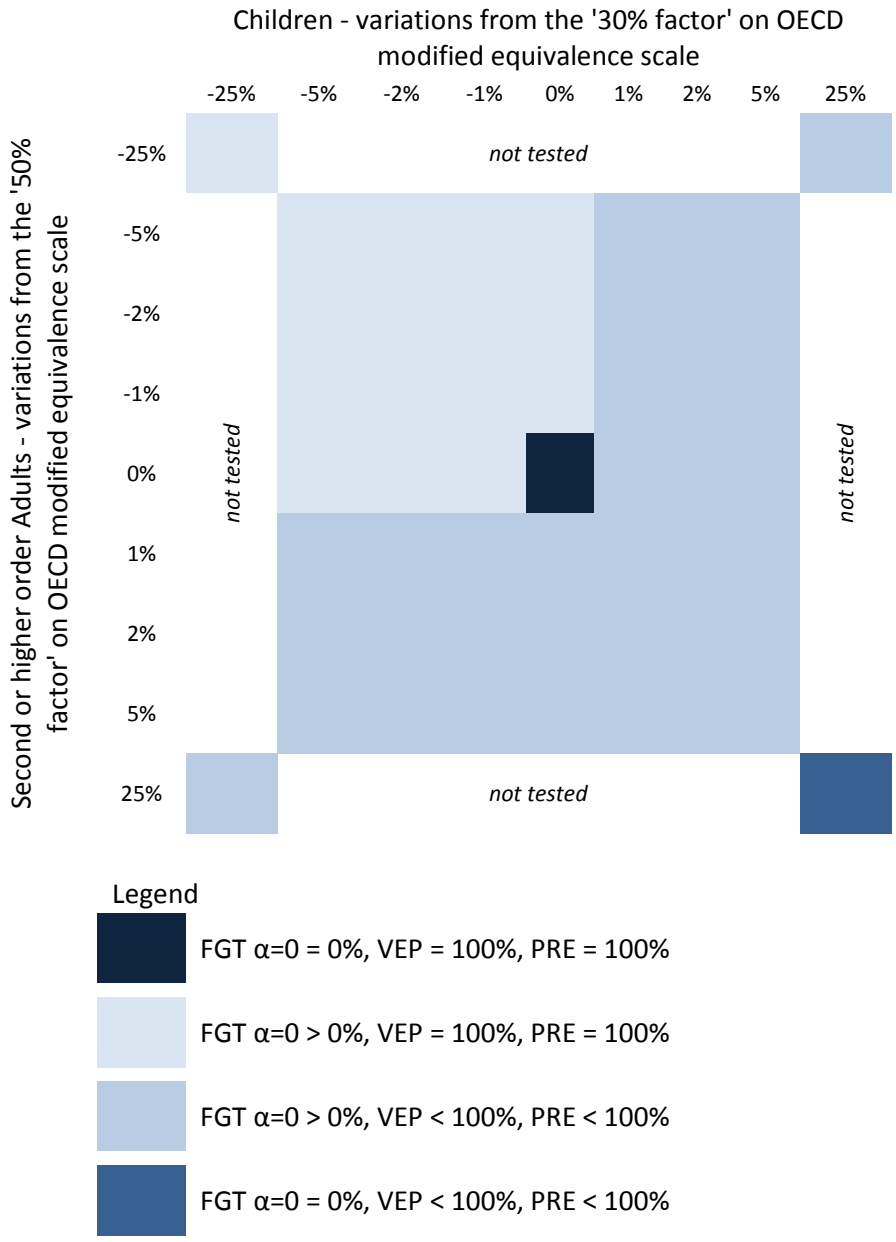
Further empirical generalization of this result can be obtained in two ways. Firstly, to study the effects on effectiveness and efficiency indicators of changing the scale factors

built-in the OECD modified equivalence scale. If any deviation from the original parameters reduces those indicators then the identity between the equivalence scale used on redistributive programs of this nature and the one used on the income distribution assessment ensures the best results in the evaluation.

Figure 4 illustrates such an exercise based on the results from simulation B through a graphical representation on the variation of three fundamental indicators: the FGT with $\alpha=0$ (poverty rate) for efficacy of PEB, VEP (Vertical Efficiency of the Program) for good targeting and PRE (Program Reduction Efficiency) for benefit adequacy. The starting point is the optimal result obtained with the OECD modified equivalence scale with zero poverty rate ($FGT_{\alpha=0} = 0$), perfect targeting on poor population (VEP = 100%) and excellent benefit levelling to ensure minimum misuse of resources (PRE = 100%). The surrounding areas represent small variations to the OECD modified equivalence scale on its children and/or second or high order adults. Three outcomes were observed: loss of efficacy maintaining absolute efficiency, perfect efficacy with loss of efficiency or loss of both efficacy and efficiency.

The values for the three indicators represented on figure 4 are displayed on a matrix in annex II.

Figure 4. PEB – impact of variations on equivalence factors on poverty rate, vertical efficiency of the program and poverty reduction efficiency



Secondly, the test can be made with the use of SII equivalence scale not only on the redistributive program, but also on the calculation of the income distribution, i.e. on the building-up of the adult-equivalent disposable income for the entire population. On

annex III a set of tables identical to the one used on this section is presented for two simulations of PEB, SII and OECD scales, respectively, based on an income distribution built with the SII equivalence scale. The results further sustain the evidence of optimal performance for the simulation using the same equivalence scale used on income distribution and poverty indicators. On that particular theoretical exercise, the SII equivalence scale displays the best results.

While the simulations focused on poverty indicators, the analysis of inequality effects would also be an important branch of research to develop. It is expected that some of the high level of inefficient expenditure observed in distribution A further contributes to reduce the overall inequality as it focus mainly on the inferior deciles of adult-equivalent disposable income. Hence, efficiency indicators should be at the centre of the discussion, as what may be inefficient spending from a poverty concerned point of view, may well be efficient spending from an inequality perspective.

5. Conclusions

The present research investigated the effects on the assessment of income redistributive social policies that derive from the use of equivalence scales created and disseminated by prestigious organizations that conduct international comparative policy analysis. By comparison to assessments made by using the equivalence scales incorporated in the social policy in evaluation, often designated as 'social assistance equivalence scales', differences in the overall performance of the policies were investigated. Based on the existent literature the differences could be expected in crucial domains: poverty measures and demographic composition of beneficiaries for means-tested benefits. Additionally efficiency measures would also be expected to reflect the differences in the judgement of relative needs that are represented by different equivalence scales. Two main questions guided the analysis. Firstly, do differences on equivalence scales used on evaluation and policy design matter in terms of beneficiaries' characteristics, efficacy and efficiency measures when the goal is to fight poverty? Secondly, aside for comparability issues, is there an incentive for governments to use internationally established equivalence scales on national social redistributive policies designed to support the poor population? Thus this research departs from highly developed investigation on the change of equivalence scales in the definition of income distributions and analysis, to focus on the effects on the impact scale changes in specific policy measures.

To test empirically these issues, a Portuguese redistributive means tested social policy benefit was used: Social Insertion Income (*Rendimento Social de Inserção*). The program was simulated with its own equivalence scale (base scenario) and two of the

most commonly used equivalence scale on this field of research, the OECD original (also known as ‘Oxford scale’) and the OECD modified equivalence scales. An additional simulation was made with the use of OECD modified equivalence scale and the levelling-up of benefits until the expenditure was equal to the base scenario.

A first result is the higher generosity associated with SII equivalence scale. Of the three scales considered, the SII equivalence scale exhibited the highest elasticity, granted a superior level of individual SII participation and also the biggest amount of transfers.

The replacement of SII scale by Oxford or OECD modified scales resulted in a reduction in the number of beneficiaries as well as a decrease on the efficacy of policies aiming to fight poverty.

Thus, based on the SII empirical evidence, it is shown that the composition of SII beneficiaries is dependent of the scale used. Additionally, higher levels of efficacy in reducing poverty intensity and severity were observed with the SII own equivalence scale, due to its biggest generosity when defining maximum benefit amounts for each household composition. The remaining scales restrained eligibility considerably and although a higher level of targeting on population in the first decile of adult-equivalent disposable income was observed, the less generosity on benefits implied less impact on poverty intensity and severity reduction.

The levelled expenditure simulation using the OECD modified scale increased efficiency and exhibited results quite near the base scenario, with substantial changes on the composition of beneficiaries in what concerned the household type.

Taking in consideration that the very low level of SII benefit reference threshold (social pension), when considering the poverty line, and the dual role of equivalence scale in defining both eligibility and benefit amounts, have considerable importance on the results obtained, a theoretical policy measure was considered and labelled Poverty Eradication Benefit (PEB).

This benefit, which corresponds to a citizenship minimum income scheme, was simulated under a strong assumption of no behaviour change, especially in what concerns to labour market participation, poverty, inactivity and unemployment traps. The main rationale behind this policy design was to follow closely the standard procedures in income definition generally used on income distribution analysis with a special emphasis on poverty investigation. Accordingly, all income definitions for eligibility and PEB amount calculations are similar to the income definitions in income distribution assessment, varying only in the equivalence scales tested, which is the centre of the present research. In this 'everything else being equal' (*ceteris paribus*) exercise the main findings show the performance sensibility of poverty eradicating policy measures when equivalence scales vary.

Within this new redistributive policy, results show that, in a well defined income policy based on complementarily of income and benefits to ensure household resources equal to poverty threshold, excellent targeting and benefit adequacy depends on using the same equivalence scale in policy design and income distribution analysis. The empirical evidence produced show variations from that identity to jeopardize efficacy (poverty rate), efficiency (Beckerman indicators) or both. For further proof a symmetrical

theoretical exercise was introduced: the use of a social assistance equivalence scale (SII) on the income distribution analysis empirically point to a similar result.

Thus, a golden rule seems to emerge in policy designing of measures to eradicate poverty: for good performance on targeting and adequate benefits, for optimal efficacy and efficiency of these redistributive measures, it is a necessary condition that policy makers adopt the equivalence scale widely used on policy evaluation, namely the one used by the Eurostat, OECD and a broad range of researchers.

Taking all these elements in consideration policy makers have an incentive to adopt 'external' definitions of certain parameters of policy design for reasons of comparability and better results on poverty indicators. Therefore, important tools to define which population groups or households types have access to social support and also the level of support they are entitled may end up being considered as endogenous variables, as opposed to instrumental variables, due to the aforementioned reasons. This discussion can be further developed on the context of contemporary analysis on policy making on the various levels of government, especially in the EU context.

Beside the political dimension of social policy making, the results open venues for further research on the role of equivalence scales on different types of redistributive programs, such as social pension, family allowances, etc. and discuss its effects on beneficiaries' composition and poverty indicators. A more clear understanding on each redistributive policy role in changing income distribution and its efficiency performance can be a major contribute to complement holistic approaches to the redistributive analysis of the Welfare State, especially in an era of severe strains on public spending.

An undeniable and necessary complement to the approach hereby developed is the analysis concerning inequality, as the definition on efficacy and efficiency on policies aiming to build a more equal society pose different challenges and perspectives than the ones related with fighting poverty.

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Annex I – Theoretical example on the impact of equivalence scales on poverty measurement

1.1. Effect of different equivalence scales on At-risk-of-poverty rate (hypothetical population and income distribution)

	Total household income	Equivalised Income	At-risk-of poverty
Family A	8,150 €		
2 adults, 1 child	8,150 €		
OECD original scale		4,075 €	Yes
OECD modified scale		4,528 €	No
Family B	5,000 €		
1 adult	5,000 €		
OECD original scale		5,000 €	No
OECD modified scale		5,000 €	No
Family C	10,500 €		
2 adults, 2 children	10,500 €		
OECD original scale		3,889 €	Yes
OECD modified scale		5,000 €	No
Family D	18,000 €		
2 adults, 1 child	18,000 €		
OECD original scale		9,000 €	No
OECD modified scale		10,000 €	No
Family E	28,000 €		
2 adults, 2 children	28,000 €		
OECD original scale		10,370 €	No
OECD modified scale		13,333 €	No
Family F	26,000 €		
1 adult	26,000 €		
OECD original scale		9,630 €	No
OECD modified scale		12,381 €	No
	Median Equivalised Income	**Poverty Threshold**	
OECD original scale	**7,000 €**	**4,200 €**	
OECD modified scale	**7,500 €**	**4,500 €**	

Annex II - PEB – Matrix on the impact of variations of equivalence factors on poverty rate, vertical efficiency of the program and poverty reduction efficiency

(FGT;VEP;PRE)		Children - variations from the '30% factor' on OECD modified equivalence scale								
		-25%	-5%	-2%	-1%	0%	1%	2%	5%	25%
Second or higher order Adults - variations from the '50% factor' on OECD modified equivalence scale	-25%	(16.19%;100.00%;100.00%)								(10.10%;97.87%;92.59%)
	-5%		(16.19%;100.00%;100.00%)	(16.19%;100.00%;100.00%)	(16.19%;100.00%;100.00%)	(15.78%;100.00%;100.00%)	(15.78%;99.99%;99.93%)	(15.50%;99.98%;99.84%)	(12.38%;99.84%;99.14%)	
	-2%		(16.19%;100.00%;100.00%)	(16.19%;100.00%;100.00%)	(16.19%;100.00%;100.00%)	(15.78%;100.00%;100.00%)	(13.97%;99.99%;99.93%)	(12.42%;99.96%;99.69%)	(11.38%;99.80%;98.62%)	
	-1%		(16.19%;100.00%;100.00%)	(16.19%;100.00%;100.00%)	(16.19%;100.00%;100.00%)	(15.78%;100.00%;100.00%)	(12.42%;99.99%;99.86%)	(11.42%;99.95%;99.51%)	(10.91%;99.78%;98.39%)	
	0%		(10.08%;100.00%;100.00%)	(10.08%;100.00%;100.00%)	(10.08%;100.00%;100.00%)	(0.00%;100.00%;100.00%)	(4.83%;99.98%;99.64%)	(4.83%;99.93%;99.26%)	(4.49%;99.76%;98.15%)	
	1%		(10.08%;99.98%;99.27%)	(8.87%;99.99%;99.29%)	(7.05%;99.98%;99.25%)	(4.83%;99.98%;99.05%)	(4.83%;99.94%;98.70%)	(4.83%;99.89%;98.33%)	(4.49%;99.71%;97.27%)	
	2%		(9.60%;99.95%;98.55%)	(7.05%;99.95%;98.50%)	(5.52%;99.95%;98.38%)	(4.83%;99.93%;98.12%)	(4.83%;99.89%;97.78%)	(4.83%;99.84%;97.43%)	(4.46%;99.65%;96.40%)	
	5%		(7.05%;99.65%;96.13%)	(5.50%;99.63%;95.80%)	(5.21%;99.60%;95.56%)	(4.70%;99.55%;95.31%)	(4.70%;99.51%;95.01%)	(4.70%;99.45%;94.71%)	(3.11%;99.20%;93.70%)	
	25%	(6.07%;91.40%;77.63%)								(0.00%;85.34%;67.23%)

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

Annex III – Poverty Eradicating Benefit simulations with income distribution based on the SII equivalence scale

3.1. Main indicators on participation, expenditure and benefit amounts

Indicators	Distribution C Simulation with SII E. S.	Distribution D Simulation with OECD mod. E. S.
No. Households	663,403	330,383
(% of total households)	*17.1%*	*8.5%*
No. Beneficiaries	1,882,349	843,088
(% of total beneficiaries)	*17.7%*	*7.9%*
Annual benefit expenditure (€)	1,574,507,800	583,136,423
Monthly average benefit amount		
per Household (€)	197.78	147.09
per Beneficiary (€)	69.70	57.64

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

3.2. Proportion of population participating on PEB by decile

Percentage of population on SII by Decile	Distribution C Simulation with SII E. S.	Distribution D Simulation with OECD mod. E. S.
1st decile	100.0%	71.1%
2nd decile	77.4%	8.3%
3rd decile	0.0%	0.0%
4th decile	0.0%	0.0%
5th decile	0.0%	0.0%
6th decile	0.0%	0.0%
7th decile	0.0%	0.0%
8th decile	0.0%	0.0%
9th decile	0.0%	0.0%
10th decile	0.0%	0.0%
Total	17.7%	7.9%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

3.3. Distribution of beneficiaries by deciles of of adult-equivalent disposable income

Distribution of beneficiaries by Decile	Distribution C Simulation with SII E. S.	Distribution D Simulation with OECD mod. E. S.
1st decile	56.4%	89.5%
2nd decile	43.6%	10.5%
3rd decile	0.0%	0.0%
4th decile	0.0%	0.0%
5th decile	0.0%	0.0%
6th decile	0.0%	0.0%
7th decile	0.0%	0.0%
8th decile	0.0%	0.0%
9th decile	0.0%	0.0%
10th decile	0.0%	0.0%
Total	100.0%	100.0%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

3.4. Participation rate by household type

Participation rate by household type	Distribution C	Distribution D	Population in poverty
	Simulation with SII E. S.	Simulation with OECD mod. E. S.	
Single adult	16.1%	16,1%	16,1%
Two adults, both under 65 years old	16.2%	8,2%	16,2%
Two adults, at least one adult over 65 years old	21.3%	4,5%	21,3%
Other households without dependent children	6.8%	1,9%	6,8%
Single parent with one or more children	32.9%	24,2%	32,9%
Two adults with one dependent child	15.8%	5,9%	15,8%
Two adults with two dependent children	20.9%	9,6%	20,9%
Two adults with three or more dependent children	34.5%	23,1%	34,5%
Other households with dependent children	21.1%	7,9%	21,1%
Total	17.7%	7,9%	17,7%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

3.5. Distribution of PEB beneficiaries by household type

Distribution of beneficiaries by household type	Distribution C	Distribution D	Population in poverty	Population
	Simulation with SII E. S.	Simulation with OECD mod. E. S.		
Single adult	5.8%	13.0%	5.8%	6.4%
Two adults, both under 65 years old	8.1%	9.0%	8.1%	8.8%
Two adults, at least one adult over 65 years old	13.8%	6.4%	13.8%	11.5%
Other households without dependent children	7.2%	4.4%	7.2%	18.6%
Single parent with one or more children	5.1%	8.4%	5.1%	2.7%
Two adults with one dependent child	14.0%	11.7%	14.0%	15.7%
Two adults with two dependent children	19.2%	19.7%	19.2%	16.3%
Two adults with three or more dependent children	7.6%	11.4%	7.6%	3.9%
Other households with dependent children	19.2%	16.0%	19.2%	16.1%
Total	100.0%	100.0%	100.0%	100.0%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

3.6. Mean income distribution by deciles of adult-equivalent disposable income

Income distribution by Decile	Distribution 1	Distribution C		Distribution D	
	ICOR without PEB	Simulation with SII E. S.		Simulation with OECD mod. E. S.	
	€	€	Δ%	€	Δ%
1st decile	2,218	3,744	68.8%	2,842	28.1%
2nd decile	3,499	3,761	7.5%	3,532	1.0%
3rd decile	4,291	4,291	0.0%	4,291	0.0%
4th decile	5,101	5,101	0.0%	5,101	0.0%
5th decile	5,876	5,876	0.0%	5,876	0.0%
6th decile	6,683	6,683	0.0%	6,683	0.0%
7th decile	7,663	7,663	0.0%	7,663	0.0%
8th decile	9,231	9,231	0.0%	9,231	0.0%
9th decile	11,958	11,958	0.0%	11,958	0.0%
10th decile	22,217	22,217	0.0%	22,217	0.0%
Total	7,874	8,053	2.3%	7,940	0.8%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

3.7. Indicators on efficacy

Indicators	Distribution 1	Distribution C	Distribution D
	ICOR without PEB	Simulation with SII E. S.	Simulation with OECD mod. E. S.
Poverty			
Incidence	17.73%	0.00%	16.62%
Intensity	4.78%	0.00%	3.02%
Severity	2.16%	0.00%	0.69%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data

3.8. Main indicators for effectiveness assessment - Beckerman

Indicators	Distribution C	Distribution D
	Simulation with SII E. S.	Simulation with OECD mod. E. S.
Total amount of transfers	1,574,507,800	583,136,423
Total amount of transfers to poor population	1,574,507,800	583,136,423
Resources spent with non-poor population	0	0
in % of total transfer	*0.00%*	*0.00%*
Poverty Gap before PEB	640,814,238	640,814,238
Poverty Gap after PEB	0	364,160,097
Reduction of the Poverty Gap	640,814,238	276,654,142
Total amount of Spillover	13,384	2,284
in % of total transfer	*0.00%*	*0.00%*
Beckerman		
VEP	100.0%	100.0%
PRE	100.0%	100.0%

Source: own calculations based on EU-SILC 2008 micro-data

3.9. Leaken indicators for financial poverty

Laeken indicators	Distribution 1	Distribution C	Distribution D
	ICOR without PEB	Simulation with SII E. S.	Simulation with OECD mod. E. S.
At-risk-of-poverty rate	17.73%	0.00%	16.62%
Relative at-risk-of-poverty gap	21.49%	0.00%	20.48%
Dispersion around the at-risk-of-poverty threshold			
40% of median	5.20%	0.00%	0.14%
50% of median	10.70%	0.00%	10.09%
70% of median	26.12%	26.12%	26.12%

Source: Instituto Nacional de Estatística - Portugal, results estimated from ICOR 2008 micro-data